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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

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EDITORIAL NOTES.

Upholding the Dessau Patents.

THERE cannot fail to be, on the part of all Britishers who have any regard for equity, a large amount of sympathy with the Dessau Vertical Retort Company, of Berlin, over the almost incessant assault that has been made for some years past upon their patents in the German Imperial Patent Office and in the Law Courts. They have been, with little intermission, continually on the defensive, but have issued from every engagement with signal victory, with the one exception when the Julius Pintsch Company and Gustav Horn successfully applied to the Imperial Patent Office for the annulment of the original patent. But this decision served only as a means for imparting additional strength to the position in Germany of the Dessau Company. The fact has been known for some weeks past that, on an appeal against the Patent Office decision, the Imperial Supreme Court again refused to deprive the Dessau Company of their legitimate rights, and on grounds that are intelligible and correct, as being those of sound justice. A full translation of the judgment appears in other pages to-day; and this judgment is in such perfect consonance with the comments made in our columns on the occasion of a previous attack on the validity of the patents [see "JOURNAL" April 14, 1908, p. 78] that we have little to add to, and nothing to withdraw from, what was then stated so far as it is pertinent to the present case.

The issues are perfectly clear; and they are made the more so by the frank admissions of the Dessau Company. In their original patent, the inventors founded their title to protection for a system of coal carbonization for gas manufacture on two prime essentials, which, with the structural features, produced three valuable effects. The two former were the use of higher temperatures than had hitherto been the practice in coal carbonization for gas manufacture, and the full charging of retorts—a method of operation that had not been previously practised, but which gave a striking lead to the revision of methods in the carbonization of coal in horizontal retorts. The outstanding effects of the system were the production of a gas of low naphthalene content, a tar low in free carbon and of quality superior to anything that had been produced before under other high temperature conditions, and a coke of improved physical characteristics, which raised its commercial value. There is quite a little host of British patents and a few German ones of antecedent date to the Dessau, that individually incorporate one or more of the several claims made by the Dessau Company. This is all admitted by the latter; but they claimed, and claimed rightly and successfully, that, prior to their own original patent, there had been no combination proposed of the essentials which yielded the results obtained by the Dessau system. Beyond this, they did not go; and their moderation more strongly inclines one's sympathy. They claimed the right to enjoy the fruits of the labours of those who from scattered elements had been instrumental in producing a determinate system and new results. Previous to the Dessau system, no one had used a similar combination in gas manufacture; and therefore no one could have known the effects, in the shape of distinctive properties of the products, of the use of such a combination.

It is a mistaken notion to suppose that prior publication or use of separate unorganized elements is sufficient to abrogate the claims to patent protection. If it were so, much inventive work would go unrewarded; and the incentives to improvement would be practically narrowed down to the single one of *kudos*. Any jurist will tell one that there is no branch of the work of Courts of Justice in which equity is observed, as distinct from the strict letter of the law, with greater freedom than the one in which invention is concerned. In this Dessau litigation, the Imperial Supreme Court considered that this was a case in which the whole matter turned on the point of "invention value;" and it gave expression to the dictum that, "in deciding whether or not a "process is worthy of protection by letters-patent, its "*objects* and its *results* must be taken into consideration." There is sense and right in this; and the result of such consideration by the Court was to re-establish the invention of the Dessau system as a novel and practical advance upon what had preceded it in the methods of manufacturing gas. It is not within our province to distinguish in any way, on the points of novelty and validity, between one method and another of constructing and working vertical retorts; but we are in agreement with the German Supreme Court that, where something is achieved that has not been achieved before, although the realization is derived from the uniting and bringing into practical form of separately known means, then those who have accomplished should not be stripped of the credit, honour, and the more material rights which are their due. In saying this, there is no prejudging the claims of any other system of coal carbonization. The right to protection of any system is a matter for individual determination, but not in the pages of a technical journal.

Atmospheric Hygiene and the Gas Industry's Trading.

THE gas industry is quietly doing its share in bringing about more hygienic conditions for the community. This much is acknowledged by those who are engaged in the smoke abolition campaign, and by all others who, for various reasons, closely study questions relating to improved health and social conditions. But the gas industry cannot be expected to pursue in this matter a course that would offer the greatest resistance to progress, nor a course that it is easier to demonstrate would be to their commercial disadvantage than advantage. Principal J. W. Graham, M.A., who delivered the Manchester University lecture last Saturday, dwelt upon these matters. What he said in the first part of the lecture is quite in accord with experience and established facts. What he said in the second part of the lecture was mixed too much with hypothetical conditions to be of any real value. The lecture was a plea for purer atmosphere and for more sunshine to brighten human conditions and lives; and there was some examination of the means, actual and possible, of achieving the end. Principal Graham gives to the gas industry full credit for what it is doing in making more sanitary our atmospheric environment. He looks upon, as it is in reality, the carbonization system of the gas-works as a coal-purification process, whereby the atmosphere is relieved of much that is deleterious; and his experience with flue-fitted gas-fires and cookers is all that could be desired. The use of gas for heating ought to be encouraged as much as possible; and Principal Graham censures the shortsightedness of local government that causes gas-fires (without taking into consideration all circumstances) to be a little dearer than coal-fires, while the reverse condition of things would turn the balance of public favour in the opposite direction. In this, there is a public error of the first magnitude.

There is no question that the solution of the problem of greater atmospheric purity partly rests with the expert; but we cannot agree with Principal Graham that to-day it rests "more" with the expert than with the public and with local government. He has himself reproached local government for doing something that just turns the balance of cost to the detriment of the advance of gaseous heating. The public are, however, responding well to the provision made for their application of gaseous heating; but the revolution of ancient heating custom is one that must proceed not in any sensational manner, but by somewhat measured steps. This is not the time to disturb the current of things in the manner that Principal Graham later indicates. He has been fired by enthusiasm for the scheme tenaciously clung to by Professor Vivian B. Lewes, of low-temperature carbonization, and the production of a coke containing from 10 to 15 per cent. of

volatile constituents—obtaining from the coal less than half the quantity of gas now realized, and a gas of high illuminating power (which nobody wants to-day), a more liquid tar and of greater richness, and so forth. The whole scheme and the computations were contained in one of Professor Lewes's Cantor Lectures, as published in the "JOURNAL" in December, 1911. Principal Graham appeals to the younger men of the gas industry to be ahead of the times, and "to cast aside the conservatism which sometimes hangs "about the older men." And we say by all means, if there is a profitable end to be gained by practical means.

Principal Graham must not overlook the fact that the beautiful structure presented by Professor Lewes was built up entirely of hypothetical conditions. In the work of the world, schemes must be tested and judged by practical and commercial considerations. The public have not shown an ardent desire for a fuel such as Professor Lewes proposes. If the mass of the public change from coal heating, it will, in our opinion, be to a labour-saving process, and not to a solid fuel one which still involves the labour and domestic inconvenience. A new "custom" is springing up, which is doing away with the worship of the poker. The Gaslight and Coke Company have found the drift of favour to the labour-saving heater by their experiment with partly carbonized coal. The public cannot be compelled to use the coke suggested by Principal Graham and before him by Professor Lewes; and there is no assurance that between them on the one side, and an irresponsive public on the other, the gas industry would not be financially wrecked if it followed the advice with a leap. There is, for example, the practical point, that the scheme displaces the difference between the present production of some 12,000 to 13,000 cubic feet of gas per ton of coal and one of about 5000 cubic feet. This difference has to be made up by the provision of coal storage, means of handling, and carbonizing power at the gas-works, as well as labour.

To effect this, a tremendous capital expenditure would be involved, which is not going to be wholly avoided by the adoption of water gas for diluting the unduly rich coal gas. The gas industry's fortunes depend upon gas; and we must work to the end of supplying the public with the largest quantity of B.Th.U. for a given price, which is not to be done by the plan originally outlined, and now revived. When, too, Principal Graham talks of high-temperature carbonization destroying chemical compounds and degrading the tar, he must consider the modern systems of carbonization in gas-works, and not the old. If we can retain a high make of gas per ton of coal handled, realize a richer tar, degrade the coke less by modifying the ill-treatment of the incandescent mass, and still continue high-temperature carbonization, is not that a better plan than entering into practices based on hypotheses, and so unsupported by the material proof which present practices can claim? The technical men who make gas, coke, and tar, and who direct the fortunes of the gas industry, are numerous, and have not been persuaded to retrace their steps to low-temperature carbonization. We are afraid Professor Lewes and Principal Graham, like Lord Rosebery in another sphere, will have to continue to plough alone in this particular furrow.

Storage and Physical Characteristics of Coal.

CONTRIBUTIONS such as the one Mr. James Lomax, of Bolton, made to the Manchester Institution proceedings last Saturday week, on the subject of the microscopic examination of coals, should induce a greater interest in the gas industry in making investigation of coals for their physical characteristics. Only by such examination can one obtain exact knowledge, for instance, as to whether or not a coal is a good one for storage purposes, whether or not trouble may be anticipated from it, and whether or not there is likely to be depreciation by stocking. There is a large amount of valuable knowledge to be obtained in this way. But what the practical issues are likely to be is another matter; as, after the knowledge has been secured, one has to make the choice of various evils. The contribution by Mr. Lomax should be read in conjunction with the first of the Cantor lectures delivered by Professor Vivian B. Lewes towards the end of 1911, as the one has a distinct bearing upon the other. In the first place, a little more practical instruction is required from Mr. Lomax as to how to prepare the thin sections (in two directions) of coal for microscopic examination. In his skilled hands, the matter may be one of comparative simplicity; but when the attempt comes to be made by a person of less experience, there is likely to be disaster to the intended subject of microscopic investigation.

However, when the examples are obtained, it will be found that the greater the amount of carbon in the coal, and the less the resinous or volatile matter, the greater the opacity and density; also the more transparent the section, the larger the amount of resinous constituents the coal contains. The resinous bodies in the coal play an important part in the question of suitability for storing; and one wants a little more exact information on the subject. Mr. Lomax tells us that coals from some seams fall quickly into slack and dirt; while others, though soft, stand the weather well. Those which fall quickly are, as a rule, pure humic coals; while those that will stand the weather are more often than otherwise those that contain a large amount of resinous matter in their composition. Thus it is seen that the resinous constituents are a protection against disintegration. Now we know that it is the resinous bodies in the coal which possess the property for the rapid absorption of oxygen; and the absorption of oxygen by stored coal tends to increased temperatures, the increased temperatures to a greater avidity of the coal for oxygen, and ultimately "spon- "taneous combustion." Something further happens, according to Professor Lewes. As the resinous compounds are attacked by the oxygen absorbed, and as the heating of the coal proceeds, it is probable that the result is the conversion of resinic into humus bodies, with the result that the coking power is lessened, and the gas and tar are degraded. When we compare Mr. Lomax and Professor Lewes, it seems that further and closer direction is wanted regarding the physical characteristics of the coal most suitable for storing purposes, as the property that enables a coal to stand well against disintegration during storage is the very one that makes easier the way to spontaneous combustion.

Gas Undertakings and Electricity Supply.

THIS subject is to-day a live one. The electricity industry, as our columns have lately shown, has awakened to the fact that the gas industry possesses special economic qualifications for entering into the business of electricity supply, as well as potentialities hitherto little exercised for becoming stronger competitors than ever, by furnishing large users with the means for obtaining electrical energy at a cheaper rate than that at which they can purchase it from the public supply mains. We do not believe the gas industry as a whole has yet fully realized its own power in this direction. Parliament has endorsed the applications of various gas undertakings for authority to carry out schemes of electricity supply. The Tottenham and Edmonton Gas Company are asking Parliament this next session for electricity supply powers in an area in which there are already three large private electric generating plants, driven by the Company's gas and engines. They are asking, too, for sanction to the conversion of their title from "Gas Company" to "Light, Heat, and Power Company"—a title which sits with greater fitness than the old one upon a concern doing such varied business in the supply of light, heat, and power agents. We have had in our columns recently the advocacy by Mr. C. H. Wordingham—one of the foremost of British electrical engineers—of the combination of gas and electricity supply. In a private letter from an esteemed correspondent, we have also the suggestion that gas-works should seek to incorporate in their productive work the generation of electricity in bulk for the supply of local electricity concerns; for he is confident that there are ways and means of using the resources of established gas undertakings in this direction, with an economy to all concerned. Further, a paper by Mr. F. H. G. Goodwin, B.Sc., read before the Manchester Junior Association, is published in our columns to-day, in which he speaks to the gas industry of neglected opportunities in connection with the power requirements of manufacturing premises. Mr. Goodwin concludes his paper with an expression of the view that the outlook is promising in connection with the extension of the business of the gas industry by meeting economically the requirements of those whose demands for electricity would justify the use of a private generating plant.

The gas industry's business has extended largely the last few years; and the industry would be false to its own interests if it did not do all possible to maintain and still further enlarge its business by prosecuting fresh service. The gas industry (which itself uses gas-generated electrical energy for driving isolated plant) is not so foolish as to think that

the demand for electricity has not come to stay, nor is it so foolish as to say, as some rabid electricians do of the gas industry, that the electrical industry is going to be wiped out of existence. Not a few gas undertakings can show, and do show by many examples, that where there is a good lighting or power load, they can supply gas and engines for driving generating plant which will produce the required energy at a price below that at which the local electricity suppliers can profitably trade. Mr. Goodwin says this is a branch of gas business the development of which has been much neglected. He is right; and there need be no scruples on the part of the gas industry in attempting to cultivate the business. The electricity supply industry does its best to turn out gas-engines, and obtain the adoption of electric motors. It would have more difficulty in doing this if the managements of gas undertakings instituted a system of periodical inspection, adjustment, and maintenance of all gas-engines, and did not allow them to fall into a state of inefficiency, and therefore uneconomy. Municipal electricity suppliers take, without justification, from the private suppliers of gas the lighting of streets and public institutions, and, through the rates, make them contribute largely to the money required for the payment for these services, and, if there is a deficiency on the electricity supply concern, the gas undertaking has to contribute heavily towards meeting it. We repeat there need be no scruples on the part of gas undertakings in showing large users of electrical energy how they can obtain a cheap and reliable supply. This, however, is not retaliation; it is legitimate business.

It is Mr. Goodwin's view that this business among factory owners has been badly managed by gas undertakings. It is not, he holds, to the credit of the industry that a factory having a gas-engine should clear it out, and take an electricity supply from the public mains, when, by a little supplementing of the plant, the manufacturer can be independent of the public supply mains, and all the liability to collapse, at the same time saving money on the quantity of energy he requires. The gas-engine holds its own where there is a concentration of machinery that can be driven from a single shaft. But there are circumstances where the electric motor offers advantages; and it is there the gas industry can prosecute fresh work in the cultivation of business in supplying the fuel for private electricity generating sets, or even fuel, prime mover, and maintenance. In no field of business in which the gas industry can operate should there be neglected opportunities. Mr. Goodwin's paper comes opportunely while there is before the industry the general subject of the amalgamation of electricity supply with the gas business where the conditions will not allow of the support of independent concerns. He emphasizes his points with a terseness of expression that we should like to see practised a little more freely in the papers presented to certain of the junior organizations.

The Manchester Tests in Circulation.

We know at least one corporation every member of which has received from Johnson and Phillips, Limited, of Birmingham, a letter and pamphlet giving a very abbreviated account of the contents of the reports on the Manchester street-lighting tests. The whole of the members of one council having received the letter and pamphlet, we have no doubt that the members of other corporations have been similarly favoured; and there is a danger of the layman in these matters being misled unless the proper interpretation of the findings of Messrs. Abady and Haydn Harrison, and an explanation of the conditions surrounding the tests, are distributed in the same broadcast manner, as, we take it, Johnson and Phillips have ensured for their letter and pamphlet. The typewritten letter (the name and address of the recipient has been obviously inserted subsequently to the printing of the body of the letter) reads: "As you are no doubt interested 'on' the subject of street lighting, we have pleasure in handing you herewith a pamphlet on 'Flame Arc Lamps *versus* High-Pressure Gas,' reprinted from the 'Electrical Review' of Nov. 1, 1912. This deals with a lighting report made by independent experts on the Manchester street lighting, and the arc lamp referred to is our 'Metroflam' lamp. This report gives you the cost, candle power, &c., of the two types of lamps; and you will note that the cost of the electric lighting is admitted by the rival experts to be less than that of high-pressure gas." We commend this matter to the notice of the Institution of Gas Engineers and to the British Commercial Gas Association. If the letter and the pamphlet have been extensively circulated, it ought to be someone's business to supply the antidote, by preparing and printing a short explanatory statement, copies of which could be purchased and distributed by gas undertakings among the members of their local councils. Otherwise mischief may be done. The editorial articles on the matter in the last volume of the "JOURNAL" (pp. 239, 415, 488, and 568) would furnish points for such a statement.

A Gas Boom in Sheffield.

As the result of some interviews with local manufacturers, a representative of the "Sheffield Daily Telegraph" has found himself in a position to write quite an enthusiastic article on the accomplishments and prospects of gas for industrial uses in the city. Though, of course, what he says as to the advantages of gas from the point of view of securing a purer atmosphere is very generally recognized at the present time, the facts must be kept constantly in the public mind, and therefore such articles in the newspaper press as the one under notice are to be welcomed. The statement is made that it is within the last four years that Sheffield manufacturers have begun to recognize the value of gas as an industrial asset; but once the possibilities were realized, it made rapid headway, and to-day it is quite beyond the experimental stage. Reference is made to the optimism of the Sheffield Gas Company in respect of this branch of their business, and to the fact that, with "characteristic enterprise," they are losing no chance of securing all the advantages of the development. For the purpose of educating the manufacturers, an experimental furnace-room was fitted up; and in this, we learn, there are now twenty furnaces of various kinds which may be seen at work. Figures quoted show that, as was to be expected, the active policy pursued, and the low price at which gas is supplied by the Company, have not been without their reward. In four years, 324 gas-furnaces have been sold; while it is estimated that there are now about 1000 in use in the city. The number of gas-engines, too, probably exceeds the latter figure. The Company are to be congratulated on their "characteristic enterprise," and also upon the public recognition of it.

Gas Legislation for New South Wales.

In previous issues of the "JOURNAL," the progress of the movement for the legislative regulation of the gas companies in New South Wales has been followed, from the introduction of the Bill to effect the object named to the passing of the measure in an amended form. The changes it underwent were indicated in the number for the 14th of January last; and in another column to-day will be found an epitome of the resulting Act. It applies in part to all companies now supplying or who may hereafter supply gas, and in part specially to the Australian, North Shore, and Newcastle Gas Companies. The provisions of the Act have been framed mainly on the lines of modern gas legislation in England. The gas is to be of 15-candle power, and the test-burner the "Metropolitan" No. 2; and penalties are imposed for deficiencies. The calorific power is to be 500 B.Th.U.; but it is not specified whether it is gross or net. The gas must be free from sulphuretted hydrogen, and be supplied at a pressure of 6-10ths from midnight to sunset, and 1 inch from sunset to midnight. The three Companies specified are given a standard price with a sliding-scale; and the standard is subject to temporary revision in the event of changed conditions of labour. New capital is to be put up to auction or tender; and the final section of the Act gives all companies power to raise additional capital, borrow money, and divide and consolidate all or any of the share capital. The annual accounts are to be filed with the Minister; and the form in which they are to be made out is given in a schedule to the Act.

Labour Uncertainties.

The uncertainties in the labour world that may produce an interruption of the supplies of such industries as the one in which we are concerned are not confined to trouble over rates of pay and hours of labour. Illustrations are before us at the moment, In the first place, there is the trouble over the dismissal of a guard on the Midland Railway. The fundamental cause of the trouble in this instance has been the subject of much publicity; and on the statements of the case that have been issued, public sympathy is somewhat inclined towards the men in this particular

instance. The question is one of discipline on the side of the Company; upon the men's side, it is a matter of principle—whether the order of a superior officer is to be allowed to override printed regulations designed in the interests of safe working. The men's Union Executive fear that there will be trouble unless the Company acknowledge that there has been official error. A second illustration comes from Northumberland. Since the Eight Hours Act was passed, the Northumberland miners have objected to the colliery owners working their pits in the manner in relation to time that they think advisable. The sympathy of the public will be on the side of the owners in this instance. The cause of offence to the miners is that the owners of some sixteen or seventeen collieries have been working the pits on the three-shift system; and the men are averse to this. Their local Society have at length asked the Miners' Federation whether they will support them financially, if a ballot of the men is in favour of a strike against three-shift working. This at the moment is not a very serious matter, except for the concerns that are drawing supplies from Northumberland, as the funds of the Northumberland men's Society and those of most of the other Miners' Societies are so much depleted that they could not, without assistance, sustain a strike. For this reason, too, there is not likely to be another national coal strike in the immediate future. The danger of interruption of supplies in the near future lies in other directions—in the railway and transport worlds particularly. There seems to be no finality to labour requirement; and a full measure of advantage is likely to be sought while Parliament displays the subservient attitude witnessed in recent years.

Obituary.

The death is announced of Mr. Roscoe Woodward, brother of Mr. William W. Woodward, of Salford, and of Mr. W. Woodward, the Engineer (recently retired) of the Bromley (Kent) Gas Company. The deceased was well known in connection with the cotton industry at Burnley.

The Leicester Corporation Gas Department have lost their oldest servant in the person of Mr. Tom Gilbert, the Superintendent of Mains and Services, whose death occurred recently in his seventy-eighth year. He entered the service of the old Gas Company in 1851, at which date the number of gas consumers was 2200, out of a population of 61,000, the price of gas 5s. 10d. per 1000 cubic feet, and the annual consumption 46 millions. He became a gas-fitter at the age of seventeen, and served under six engineers. He had watched the progress of the gas undertaking till the consumers equalled in number the entire population of the borough in his early days. He was devoted to his work; and his memory will be long cherished by those who had the pleasure of his acquaintance.

Institution of Gas Engineers.

Mr. W. T. Dunn, the Secretary of the Institution of Gas Engineers, has issued circulars notifying members of decisions arrived at by the Council on the various matters set forth in the account of the proceedings published in the "Journal" for the 18th ult. (p. 449). In regard to the proposal that the Birmingham Medal should be awarded to the President (Sir Corbet Woodall, D.Sc.), Mr. Dunn says that as Governor of the Gaslight and Coke Company, the President "has initiated and carried out schemes in manufacture and distribution that have not only benefited that undertaking, but have been of great advantage to the whole industry. His acceptance of the office of President during this, the Jubilee year of the Institution, is a further manifestation of devotion, and is of the greatest value to the industry. The Council feel sure that the members will take this opportunity of adding to the honour recently conferred upon the President, by asking him to accept the Birmingham Medal, and thus to include his name in the list of its distinguished recipients." The Council will, nevertheless, be glad to receive, not later than Saturday, April 5, the names of any other persons members may consider suitable for consideration in making the award. The second circular intimates that arrangements are in progress for the fiftieth annual general meeting, which will be opened in London on Tuesday, June 17. Also that invitations have been extended, by the courtesy of the Council of the Illuminating Engineering Society, for members of the Institution to attend the following meetings at the Royal Society of Arts, John Street, Adelphi; tickets for which will be forwarded on application to Mr. Dunn: March 11—Lecture by Mr. W. J. Liberty on the "Historical Development of Gas in England." April 15—Joint meeting of the Societies represented on the "Standard Specification on Street Lighting" Committee. The Council have decided to extend the patronage of the Institution to the National Health Exhibition, to be held at the Holland Park Rink, from May 16 to 31. Members will, on application to Mr. Dunn, in due course receive complimentary tickets of admission for their use.

ELECTRICITY SUPPLY MEMORANDA.

The peaceful intentions of Mr. C. H. Wordingham in contributing to our columns the article on "Our Friend the Enemy," which article he opened by casting reflections upon both electricity and gas for certain purposes, has brought upon his contentions—friendly and otherwise—quite an avalanche of criticism. As on our own part, so on the part of the "Electrician," the criticism has a favourable and an unfavourable side. In the case of "Electrical Industries," nothing that Mr. Wordingham advanced in his article is right, or seems to have a shred of intelligible substance to support it. The "Electrician" agrees that, under certain conditions, there are advantages to be derived from the fusion of gas and electricity supplies. "Electrical Industries," on the other hand, does not share the confidence of our electrical contributor that the interests of the public would be served by the proposal. It is of opinion that a gas company, though providing the capital for an electricity supply undertaking, would not, in order to make the capital profitable, push electricity. According to the faith that is deeply resident in some electricians, there would be no necessity for "push," as the mere presence of electricity would ensure the ultimate extinction of the gas interests. We are not so sure, however, that "Electrical Industries" sincerely believes in the vapourings of its electrical contemporaries on this point. If it did, it would find no necessity for the competition in which it sees the highest ultimate economy for the public. "No one can deny," says our contemporary, "that stimulus towards higher economy comes from rivalry between the two industries." That depends, as was pointed out in our first comment upon Mr. Wordingham's article, upon the circumstances under which the competition takes place. Our contemporary must realize that economies cannot fail to arise, in territories that are not overwhelmed with opportunities for competing enterprise, from dual management and operation, rather than from the duplicated machinery necessitated by separate undertakings. In its worship of competition as an economy promoter, our contemporary overlooks the struggles of, and the delimitations placed upon, competing concerns in many circumscribed provincial areas, as well as the depreciation of capital, through the narrowing-down of the profits. All the economy (the greater part of which can be ensured to the public by legislation) of the combination undertaking is lost to the public; and if the separate undertakings are to live and enjoy profit from their investment and enterprise, then they must charge the public accordingly. It is a question that must be looked at from the broad point of view, and not from the narrow one of prejudice. Better by far than having a struggling profitless electrical undertaking with high charges must be a supply of electrical energy by a gas undertaking to those who require it. That is common sense; but "Electrical Industries" can only look at the matter from one point of view, and that not the one from which all sides of the question can be seen. Our contemporary talks of the electrical industry not seeking a truce with the gas industry, but preferring that the fight be continued. There is ample room for fighting (from which the gas industry emerges year after year with a greater business) without making many small provincial areas suffer the consequences.

Mr. Wordingham's Critics.

Electrical Disagreement.

The other part of Mr. Wordingham's contribution to our pages is attacked unmercifully by our contemporaries; and we fear the criticism in our pages and theirs will act as a deterrent to our friend again entering this particular polemical field. The tame and somewhat featureless letter from him in our columns last week did not evince the fighting spirit that was looked for from one who had assumed to a certain extent, a dogmatic attitude in originally dealing with the relative positions of the competitors. We had hoped that Mr. Wordingham would have taken up the comment on the part of his contribution from which we differed with the keen vigour of one who, having adopted a certain attitude in adjusting the lines of demarcation of business in various directions of the two industries, was prepared to defend the premisses from which his deductions were drawn. In every attempt that has been made in our columns to get an electrician to defend the postulatory position he and his compeers have adopted, there has been utter failure, except in the case of the former "Engineering Correspondent" of the "Daily Telegraph;" and the result of the controversy was an admission by him of error. In the case of Mr. Wordingham's article—referring to the first part—we are in disagreement on several points with him. Our electrical contemporaries are also in disagreement with him on matters with which we are in closer agreement.

Gas and Electric Heating.

We will not run over all the matters touched upon by our contemporaries in attacking Mr. Wordingham's well-meant, if a little biassed, article. Take the point of heating as an example. The "Electrician" admits that "for serious heating" electricity is handicapped. But it thinks it would be a far safer prophecy to say that "serious" heating propositions will remain with coal in domestic premises rather than

with gas. It is also stated that "it is common knowledge that the gas-fire is not popular for continuous heating in private houses." If the "Electrician" refers to some retail coal merchants, they will, if truthfully disposed, say that they are not at all enamoured of the growth of popular favour for gas-heating, and that it is not the old unpopular forms of gas-fire (which were splendid heat convectors and not radiators) that are making gaps in the retail coal business, but the modern economical gas-fire, which radiates such a large percentage of the heat furnished by the combustion of the fuel. Last half year the Gaslight and Coke Company connected up between 36,000 and 37,000 gas-stoves; how many others were privately fixed in their area is not known. It seems, however, that both the "Electrician" and "Electrical Industries" have a very thin opinion of gas-fires as a class. The former says that the best gas-stove is but a poor imitation of the coal-fire, for the reason that the heating intensity of the flames is comparatively low. We hope an interpretation of this cryptic statement will be published. Perhaps it is to be found in the equally profound statement that, "if a gas-fire is used, a great deal of heat passes up the chimney." The interest grows warmer, when we come across this remarkable statement: "Now if the gas-fire has an efficiency of 20 per cent., which is considerably higher than that of the average coal fire, then 3300 B.Th.U. become available for 1d. [that is to say 3300 of the 16,500 B.Th.U. purchasable for 1d.]; and this is less than the heat obtained from the electrical energy which it must be remembered is used with an efficiency of 100 per cent." "Electrical Industries," too, remarks that "Mr. Wordingham says nothing about the low efficiency of the gas-stove, as compared with the electric radiator." Let us get to close quarters with our electrical friends. Science tells us that the radiant form of heat is the most healthful, and that heating by convection should be discouraged—perhaps not completely, but to a large extent. Is this disputed by our electrical friends? Then if we say that an electric radiator only gives about 30 per cent. of its heat in the radiant form, and the balance in the form of convected heat, will that be controverted? Further, are they prepared to deny the accuracy of the results of the gas-fire research carried out over some three years or so by the Fuel Department of the Leeds University? In this research, test after test showed that the modern gas-fire gives some 50 per cent. (55 per cent. was recorded in certain cases) of the heat of combustion in the form of radiant heat, 20 to 25 per cent. as convected heat, and the balance as flue heat, which the hygienists say is an excellent thing for maintaining a change of air in rooms. This change the ill-named electric radiator does not effect; and as between radiant and convected heat, the efficiencies of an electric radiator compared with a gas-fire are exactly reversed. We take a penny-worth of 2s. 6d. gas. Some 75 per cent. of the 16,500 B.Th.U. (taking 500 B.Th.U. per cubic foot) is given off as useful heat into the room, which 75 per cent. represents 12,375 B.Th.U. If we give the electric radiator 100 per cent. efficiency, electrical energy at 1d. per unit will, says the "Electrician," only purchase 3410 B.Th.U. Where then are the grounds for its absurd comparison and 20 per cent. efficiency, or of the "Electrical Industries" "low efficiency of the gas-stove?" We should like our friends to be a little more explicit.

Carbon Dioxide and Oxygen.

There was a point in Mr. Wordingham's letter published last week that bears upon a paragraph in the "Electrical Times" written by our revered friend "Meteor." Mr. Wordingham wrote: "Stirring up the air in a room is not ventilation." Of course, no one has ever said it was. But let that pass for the moment; the important point being that Mr. Wordingham proceeds to say: "If the motion of air is obtained by burning its oxygen, and substituting a 'poisonous' gas for it, only harm can result." Now "Meteor" is getting the hang of things in this connection; Mr. Wordingham obviously has not done so yet. The former has been reading about the experiences of the Antarctic heroes; and he finds this in the Northern party's journal: "On two occasions during blizzards, the ventilation got blocked with snow; and the party were almost asphyxiated. The lamps and the stoves refused to burn until a passage had been dug." In other words, human beings can live, and have energy to dig a passage, after the air has been depleted of so much oxygen that combustion cannot be supported. That is a confirmation from a very distant place of the researches of Dr. Leonard Hill, which showed that so long as any form of combustion can be supported, and within limits after, there is sufficient oxygen present for the support of human beings. Perhaps Mr. Wordingham will readily see the bearing of this upon the belief that he has in effect expressed in the words quoted above. The point as to carbon dioxide being "poisonous" was dealt with last week. If what Mr. Wordingham puts forward is true, as to the burning-up of the oxygen (insinuating thereby that the air is being depleted of its oxygen), then combustion must first cease, and life would ultimately be extinguished by suffocation. But if combustion goes on—showing there is ample oxygen present for human requirements—then fresh air must be finding entrance, and polluted air (polluted by human exhalations rather than by the products of combustion) an exit; so that the movement set up by combustion must be beneficial. If there is no movement of the atmosphere, whence does the supply of oxygen come? Let Mr. Wordingham think over the subject, and then try again. But returning to "Meteor." He refers to the geyser tragedy at Peckham. He mentions that "the bath water was heated by a gas apparatus." His reference would have had a little less meanness about it if he had stated that all types of bath-water heating geysers that have not a ventilating tube attached are condemned by gas authorities, and are not fixed by them. Of tube-ventilated geysers, there are thousands upon thousands in use; and can "Meteor" produce a case of fatality by one of these? It was stated at the inquest that the Peckham family had had a ventilated geyser in use for years, without the slightest trouble or inconvenience, until at length it required renewal. Unfortunately the Gas Company were not consulted; and a geyser without a ventilating-tube was privately fixed. "Meteor" ignores these points; and by doing so does an injustice not only to himself, but to the gas industry.

Bankside Water-Heater.

Our electrical contemporaries now and again treat their readers to little dissertations on the subject of water heating. There is always something humorous about their writings on the subject which are intended to be solemn—so much indeed that is humorous is found that we have seen, with sympathetic feelings for our electrical journalistic friends, an electrical engineer with energy for sale convulsed by merriment on perusing what is written. The "Bankside" electric water-heater had introduction some time ago; it has had its resurrection in the pages of the "Electrical Times." This heater has a reservoir of 1 gallon capacity; but the tap is located so that the whole gallon cannot be extracted. That is a prudent provision. If the current is left on when the water is drawn off, and the apparatus gets heated up, it is advisable to allow time for cooling before replenishing. The consumption of energy is at the rate of 1 kelvin (kilowatt-hour). The time factor is generally of importance in water heating. Listen to this: To raise by the "Bankside" heater the temperature of a gallon of water (initial temperature not stated) to 130° Fahr. takes one-and-a-half hours; to get the gallon of water to boiling-point, the time occupied will enable the householder to take a trip from London to Brighton and back, and permit him to spend an hour by the briny, knowing full well that the water will not "boil-over" in that space of time. To be more explicit, to raise the gallon to boiling point requires three-and-a-half hours. If half-a-gallon of boiling water is all that is needed, only a matter of two hours will be required; so that the Brighton trip is then off. There is the advantage in these leisurely modes of doing things that it gives one plenty of time for other occupations before coming to the one for which the boiling water is desired; and this obviates any undue excitement.

Views from Germany.

A gentleman by the name of Adolph Rittershaussen describes in the "Electrotechnische Zeitschrift" a heat-accumulator water-heater of his own design. We will not describe it; but Adolph Rittershaussen's views are interesting on the subject of prices. In his opinion present experience seems to show that electric cooking is only profitable at a price of 1½d. to 2d. per unit, if hot water can also be provided at this price; otherwise it appears that only a little more than one-third of the necessary heating required for housekeeping purposes (apart from the heat needed to warm the rooms themselves) can be provided electrically, while the remaining two-thirds has to be provided in some other way. In order to compete in the matter of water heating—*i.e.*, for kitchen and washing purposes—it seems necessary to come down to a price of a little more than ½d. per unit, and this price seems too absurdly low to be of any use. But this price must be taken in conjunction with the fact that the load-factor can be materially affected by a proper adjustment of hours. It can be regarded not only as a night load, but to some extent as a day load. Very good! Up to the present time, we have not observed that water heating on the continuous energy-fed principle has improved the supply conditions of any central station.

What Did Mr. Cramb Say?

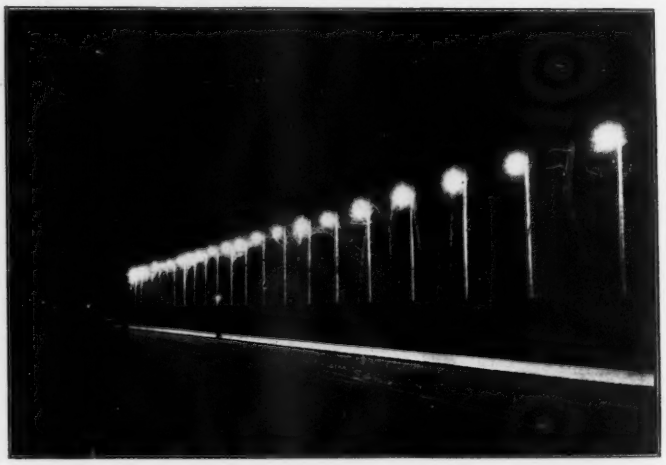
Readers of the "Memoranda" will have no difficulty in recalling our controversy recently with Mr. Cramb, the Electrical Engineer of Croydon, and "Meteor" of the "Electrical Times," regarding the lighting of certain churches in Croydon. The latter did most of the talking or rather writing; Mr. Cramb kept himself a bit in the background, and completely retired into obscurity after being challenged to a test. Nothing has been heard of him (excepting the news that he has retired from the Vice-Chairmanship of the Electricity Publicity Committee) since the question was asked as to the conditions upon which he would become a party to such a test as we suggested. However, he is the object to-day of our profound sympathy. One of the churches that he cited as having saved money by supplanting an out-of-date gas-lighting system by up-to-date electric lamps was Christ Church. Our eyes alighted on this paragraph in a morning newspaper last Friday: "Twice, during a confirmation service at Christ Church, Croydon, on Wednesday evening, the lighting arrangements broke down; and the church was plunged into complete darkness." The authorities of Christ Church had better have retained gas, and had the system modernized, than have had this happen. We wonder what Mr. Cramb said when the intelligence reached him; we also wonder whether he will send an account of the occurrence to the "Electrical Times" and to the church papers. If he does not, "Meteor" may, if he desires, reproduce this paragraph.

ANTWERP GAS EXHIBITION.

THE ENTRANCE GATE OF THE EXHIBITION.—THE COLUMNS ARE SURMOUNTED BY GAS FLARES AND SEARCH LIGHTS.

THE International Gas Exhibition at Antwerp—the first ever held in Belgium, and a description of which appeared in our columns last week, together with an account of the opening ceremony—has now completed the first week of its life. The promoters are fortunately able to report the unqualified success of the enterprise. Some idea of the popularity of the exhibition, and the appeal which its attractions and its novelty have made to the public, may be gathered from the fact that no fewer than 20,000 people were admitted to the hall on the first six days. This is surely enough to justify its existence, and a fair reward to the organizers for all the pains and trouble they have spent on their task, the difficulties of which can be best judged by those who have seen something of the actual preparations in the hall, which, after all, constitute but a small proportion of the whole work of the Committee.

Lectures are given in the afternoons and evenings, in the French and German languages, by Mrs. Pagenstecher, a well-known lady lecturer from Berlin. She is an expert on cooking by gas; and her lessons and demonstrations have been greatly appreciated by the large number of visitors who have always been present at them. Other attractions—such as competitions for school children—are also provided; and, encouraged by their popularity, the Committee have decided to continue them till the end of the exhibition.



The Grounds as seen from the Street, illuminated with High-Power Burners of 500, 1000, and 1500 Candle Lamps by Graetzin, Mannesmann, and Blanck.

The Grounds and Band Stand at Night.

This week the Association of Gas Engineers of Belgium are to be the guests of the Compagnie du Gaz d'Anvers. The Committee will be the hosts at tea in the exhibition hall on Wednesday, and the same evening the gas engineers are holding a "Raout;" the next day a visit is to be made to the new installation of settings of eighteen-retort Dessau verticals at the Anvers-Zurenborg Gas-Works. After the inspection, the visitors will be the guests of the Gas Company at a luncheon in the Marble Hall of the Zoological Gardens.

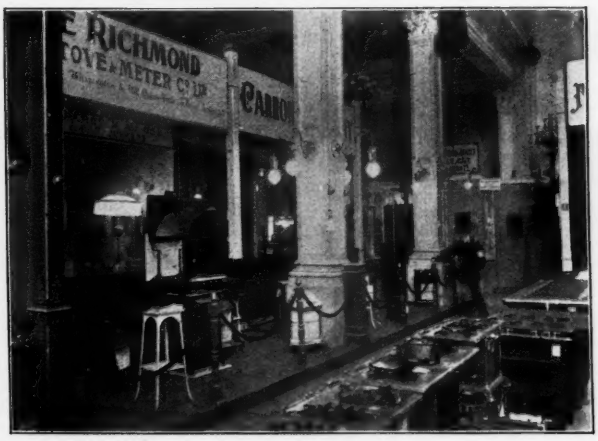
The exhibition is to remain open until the 24th of this month. It should do much towards the instruction of the public, who, as Mr. Hayman remarked in his opening speech, are sadly ignorant as to the uses to which gas can be put, and, as a matter of fact, in an extraordinary number of cases, scared at the mere mention of the use of gas in the household. It is to be hoped, therefore, that some more material gain, as well as satisfaction at the popularity of their enterprise, may accrue to the promoters of the scheme.

The accompanying illustrations are from photographs kindly sent by Mr. A. F. P. Hayman, which were, he informs us, taken by Mr. Van Doorslaer, a member of the Gas Company's staff.

Fletcher, Russell, and Company.

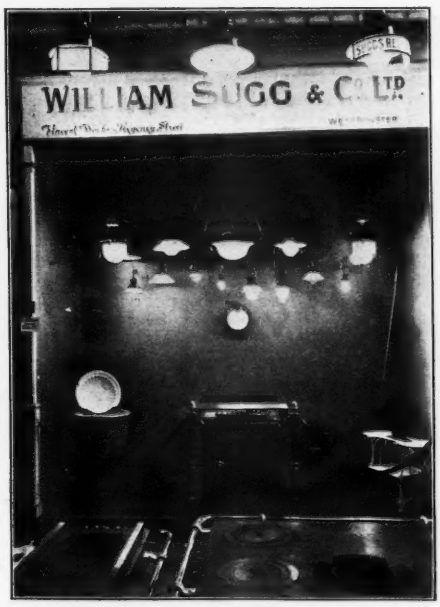
The Cannon Iron Foundries.

John Wright and Company.



Richmond Gas-Stove Company. —— Carron Company.

The Davis and Parkinson Gas-Stove Companies.



William Sugg and Company.

SOME OF THE STANDS OF THE PRINCIPAL ENGLISH EXHIBITORS AT ANTWERP.

One of the leading public men of Stony Stratford—Mr. W. R. Parrott—has just succumbed (aged sixty-six) to an attack of influenza. He was the Chairman and Managing-Director of the Stony Stratford Gas Company.

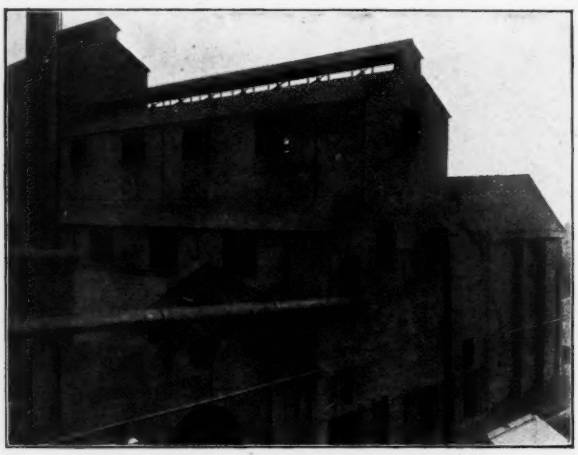
We regret that in the notice of the late Mr. J. M. Veevers which appeared in the "JOURNAL" last week, Mr. C. Foster Veevers, the Secretary and Manager of the Northfleet and Greenhithe Gas Company, was described as the son, instead of the youngest brother, of the deceased.

It is reported that Dr. E. B. Rosa, of the Bureau of Standards, at Washington, will be asked to act as their representative on the International Photometrical Commission. Our informant adds that the recommendation will be found quite acceptable.

According to the Paris Correspondent of the "Daily Mail," the French Academy of Science have appointed a Special Commission to investigate the properties attributed to the divining-rod. One of the theories to be tested is whether secret water-springs possess radio-activity which reacts on people of extreme sensibility.

THE "HY-RIB" SYSTEM OF CONSTRUCTION.

It is believed by some people—but no doubt quite wrongly—that there is a prevalent idea among one of the sexes that the most interesting way to start the reading of a book is to turn to the last page and see how the story ends. Whether or not this is a desirable method of procedure in general practice, may be left for individual determination; but there are particular cases in which its adoption is clearly not unsatisfactory. For instance, the Trussed Concrete Steel Company, Limited, of Caxton House, Westminster, have lately issued a book explaining the nature and application of the "Hy-Rib" system of construction; and the final page of this contains a list of some of the users. Now, in this list there are included quite a number of gas companies; and therefore anyone connected with the industry who glances through it would be induced to apply himself to the preceding portions of the book—even if his interest in "Hy-Rib" had not already been aroused. It is explained that "Hy-Rib" is a steel sheathing stiffened by rigid high ribs. The ribs and the lath are manufactured from a single sheet of steel, making it a complete unit of lath and studs. No centring is required for spans of given area where "Hy-Rib" is used in concrete floors and roofs, as the ribs give sufficient strength and rigidity; while in walls and partitions "Hy-Rib" does away with the use of small stiffening channels and rods. The lath surface is, it is pointed out, straight and true, and is expanded in such a manner as to provide a perfect key with a minimum amount of plaster.



"HY-RIB" CONSTRUCTION AT HULL.

The book contains a large number of photographs of work carried out on the "Hy-Rib" principle; and among these is the accompanying illustration of a retort-house for the East Hull Gas Company. Among other work, completed or in hand, for gas undertakings, the Company instance a steel-framed retort-house extension at Eastbourne; the steel framing being covered by "Hy-Rib" at the sides and ends. The framing at the end is at about 7 ft. 11 in. centres; and the stanchions are 10 feet apart, with light intermediate angles. The walls are 2 inches thick on "Hy-Rib;" and the building will be, roughly speaking, 50 feet high, 62 feet wide, and about 110 feet long. For the Gaslight and Coke Company, a floor is being put down consisting of "Hy-Rib" and concrete. In some cases, the "Hy-Rib" is laid on the top of rolled steel joists, and in others is arranged to form jack arches between the girders. Another floor is for the workshops of the Liverpool United Gas Company—about 80 feet long by 30 feet wide, with rolled steel joists at an average distance of 8 feet. There is "Hy-Rib" reinforcement with concrete 4 inches thick on top, and plastering on the underside. Just one other instance may be mentioned now—the record is, of course, far indeed from being a complete one, and makes no mention of at any rate one very extensive job. At the Redditch Gas-Works, a tank 30 feet in diameter was put down, covered in with "Hy-Rib" construction, which consisted of laying "Hy-Rib" on rolled steel joists spanning the circle. Concrete was placed on top of the "Hy-Rib," and soil over the concrete.

Cementation of Iron by Gases.—Herr F. Kurek, writing in "Stahl u. Eisen" [Vol. XXXII., p. 1780]—says that experiments on cementation were made by using carbon monoxide, methane, and illuminating gas, and the same gases with an admixture of ammonia. The results showed that cementation with carbon monoxide at ordinary pressures cannot be advantageously employed (the carburization being too slow), and that the addition of ammonia is not favourable to the formation of carbide. Methane at 800° C. had no action; but at 900° and 1000° C. it caused considerable carburization. Illuminating gas yielded markedly higher carbon in the outer layers than methane. At 800° and 900° C., carburization did not penetrate far into the iron; but at 1000° C. carbide was formed throughout. Admixture with ammonia was not found to be of any advantage.

THE DESSAU VERTICAL RETORT PATENTS.

The Text of the Recent Judgment.

Reference has been made on several occasions in our columns to the hearing in the German High Courts of the case in which the Dessau Vertical Retort Company were appealing against the decision obtained by the Julius Pintsch Company and the firm of Gustav Horn in another Court, which had declared the Dessau patents null and void. We are indebted to the Dessau Company for a copy of the text of the decision of the Supreme Court given on Jan. 11 of this year. In view of the interest attaching at the present time to all matters which concern vertical retorts, we are giving a full translation of the German document. The judges of the Supreme Court which upheld the full validity of the Dessau Patents (thus reversing the former decision) were: The President, Herr Dr. Planck, and Herren Dr. Hagens, Dr. Düringer, Berendes, Burlage, Katluhn, and Dr. Czolbe. The decision, which is dated Feb. 15, further states that the costs are to be borne by the Pintsch Company and the firm of Gustav Horn.

The Facts of the Case.

The following claim is made under patent No. 167,367, which came into force on the 29th of July, 1903, granted to the German Continental Gas Company and Dr. Bueb, of Dessau—

> "A process for the manufacture of gas by the use of vertical retorts, preferably tapering towards the top; the distinguishing features being that, in order to manufacture a lighting gas poor in naphthalene, while simultaneously producing a high-grade coke and a tar in the form of a light flowing brown oil, low in carbon content, the distillation takes place in a retort heated above the usual temperature employed in the manufacture of gas—*i.e.*, from 1300° to 1500° C.—and which is entirely filled with coal, thus avoiding a free space which would tend to facilitate the separation of tar."

The patent specification was issued on the 11th of December, 1905. Pursuant to a deed drawn up on the 19th of November, 1909, all rights in the patent were transferred to the Dessau Vertical Retort Company, of Berlin.

Against the last-named Company, the Julius Pintsch Company, of Berlin, and the firm of Gustav Horn, of Brunswick—the former on the 5th, and the latter on the 10th of December, 1910—brought an action to nullify the patent, on the grounds that at the time the patent was applied for, the alleged invention claimed by it was no longer a novelty [Section 10 No. 1 of Patent Law]. The Julius Pintsch Company contended more especially that the claims set forth as follows, were already covered by the following patent specifications: The high heats, in the British patents No. 2487 of 1872, and No. 1377 of 1882; complete filling of the retorts, in the British patents No. 2487 of 1872, No. 1377 of 1882, No. 3334 of 1862, No. 4795 of 1880, and No. 5712 of 1828; avoiding the necessity for a tar separator, in the British patents No. 5712 of 1828, No. 2487 of 1872, No. 1377 of 1882, No. 334 of 1862, and No. 4795 of 1880; and the process as a whole, in the British patent No. 2312 of 1883.

The firm of Gustav Horn cited the German patent No. 14,050 of 1880 and No. 140,928 of 1903 and the British patent No. 343 of 1890 to prove that vertical retorts without tar separators were known before the filing of the patent now under dispute. Further, that the German patent No. 140,928 of 1903 showed that the complete filling of the retorts, and again the German patents No. 56,489 of 1890 and No. 59,635 of 1891 showed that the high temperatures, had already been described. They argued, moreover, that the patented process had already been employed in the so-called Kleist chamber-oven; and they cited various publications and the whole of the evidence in the nullity suit brought by Aug. Klönne, of Dortmund, against the former holders of defendants' patents. The plaintiff for annulling the patent, Gustav Horn, argued, moreover, that the complete filling of the retorts with coal is a self-evident operation, and that a temperature of from 1300° to 1500° C. is not essential to the success of the process. In connection with this, he applied as an alternative for the patent to be in part declared void—that is, that its characteristics with regard to filling the retorts full of coal and the avoidance of a tar separator should be struck out of the patent specification and that the claims of the latter should be confined to the temperatures used. To support their case, both plaintiffs, in the course of the action, cited the expert opinions of Professor Rau and Professor Drehschmidt, which were made use of in the civil action brought by the defendants against Klönne.

The defendants in the nullity suit pleaded that the action for nullification should be dismissed. They acknowledged that, before the date of the application for the patent, vertical gas retorts with upper gas take-offs, and without tar separators, were known, and that it had always been the endeavour of gas engineers to work at as high a temperature as possible. At the same time, they point out that a process embodying their patented combination was not known and had nowhere been employed before their application for a patent was deposited. In practice, the use of vertical retorts had been avoided; those of the horizontal or inclined type being preferred. The filling of the retorts quite full was considered dangerous, owing to risk of cracking. Such high

temperatures as those mentioned could not be used where cast-iron retorts were employed or recommended, as these would in no way be able to stand such temperatures.

The Imperial Patent Office united the proceedings, *re* both pleas, and by their decision of the 18th of March, 1912, declared patent No. 167,367 to be null and void.

By their appeal, lodged within the prescribed time, the defendants to the nullity suit applied for the decision to be reversed and for the plea of nullification to be dismissed. The plaintiffs thereupon applied for the dismissal of the appeal.

Reasons for the Judgment.

According to the finding of the Senate of the 24th of April, 1909 [Rep. I. 337, 1908], the patent in dispute is a combination patent, consisting of the following essentials:—

1. The use of vertical retorts.
2. The complete filling of the retorts with the material to be distilled.
3. The avoidance of a special space for the separation of tar.
4. Heating in excess of temperatures used up to the present time—that is, from 1300° to 1500° C.

This combination is chosen for a threefold purpose, viz.:—

1. The production of a gas poor in naphthalene.
2. The production of a light flowing tar poor in carbon.
3. The production of a high-grade coke.

The plaintiffs to the nullity action have put in an extraordinarily large amount of evidence to prove that the several essentials, and even combinations of these essentials, were known before the patent was applied for. But in the present action they have failed to prove that the combination protected by the patent in dispute had been used for the purposes claimed, and with this undisputed success which had followed its employment, neither had it previously been described or published before the application for the patent in question.

In the appeal action, particular stress is laid on the British patents No. 5712 of 1828, No. 3334 of 1862, and No. 2312 of 1883. The first-named patent provides for the use of vertical retorts without any special tar separating space, but does not specify the filling full of the retorts. It also does not contain any mention of the degree of temperature according to which the patent in dispute is to be worked. Patent No. 3334 also deals with vertical retorts which have no tar separating space. The retorts, however, are not filled up with coal, but a cylinder is let down into the retort and the space between it and the sides of the retort is filled with coal. Patent No. 2312 has principally for its object the distillation of coal dust. In the middle of the vertical retort there is placed a hollow lining, containing no coal at all, provided with perforated sides, and taking up about one-third of the capacity of the retort. Also the object and the mode of construction of the Kleist vertical coke-ovens (quoted as being prejudicial to the claim of novelty in the patent) are different to the arrangement as set forth in the specification in question. Moreover, they work at much lower temperatures.

Although the parties to this action are in dispute as to the meaning and the bearing of each of the several opposing claims, there still exists a certain agreement as to the following main points:—

(1) The appellants must acknowledge that all the several elements of the combination, and also the combination of the several elements, were facts of common knowledge, owing to previous publication.

(2) The respondents must acknowledge that before the filing of the patent, the process as set forth in the claim in dispute had nowhere been described or used in its entirety for the manufacture of gas, with the simultaneous production of bye-products possessing distinctive properties.

The dispute, therefore, finally turns on the point of the so-called "invention value." The issue to be examined and decided upon is, whether the claims as set forth in the patent, taking into consideration what was previous knowledge and the state of science at the time of the filing of the same, are to be considered as an advance in the path of invention. In the patent action brought by Klönne against the previous holders of the defendants' patent, the Imperial Patent Office and the Supreme Court of Justice answered this question in the affirmative. In the present action the Patent Office in the Appeal Court on the 18th of March, 1912, gave a negative answer. The decision of the latter Court was mainly based on the consideration that, as all the elements of the combination were matters of common knowledge, the combination could not of itself contain the essentials of an invention; and that the filling of the retorts was the natural method; that the heating up from 1300° to 1500° C. was merely the natural consequence of modern science having been able to produce a special fire-resisting refractory material. The disputed patent could only claim to have been the means of introducing an up-to-date method of working, and was not based on any inventive perceptions; so that any expert, in using proper working methods, must have very soon spontaneously adopted the process claimed by the patent.

This view of the Patent Office cannot be upheld. We are dealing with a combination patent in the narrowest sense of the term. All the component parts of the combination were matters of common knowledge; but by uniting them—that is, by dovetailing the proposed methods into one common whole—a certain result, a particular combination-effect, has been produced. In deciding whether or not a process is worthy of protection by letters patent, its *object* and its *results* must be taken into consideration. In no single one of the publications cited as anticipating the patent is the threefold object of (1) the *simultaneous production* of a gas poor in naphthalene, (2) a thin flowing tar, poor in carbon, and (3) a high-grade coke, aimed at or attained. If the Patent Office is of opinion that, by a proper method of working, combined with the use of more modern technical resources, this would lead to the spontaneous use of the process claimed by the patent in dispute, the fact still remains that prior to the filing of the patent, the process in question had nowhere been in use.

It is due to their efforts that the patentees were the first to show how a successful method of working could be ensured by enlisting the help of modern resources.

By means of the process recommended in the patent, methods have been adopted which were certainly known in practical working, but which had been abandoned as unpractical, or avoided as dangerous. The plaintiffs in the nullity suit were not able to show that vertical retorts, as already recommended in the year 1882, had been anywhere in extensive use before the filing of the patent for the process in question. In practice, the use of horizontal or inclined retorts was preferred, although it was known that, by the use of vertical retorts, higher heats could be employed, and that the latter were also generally considered to be an advantage.

Practical men were sceptical as to the utility of filling the retorts full, as it was feared they would crack. The increase in the heats did not first become a matter of common knowledge subsequent to the filing of the patent, but was known a great many years before—in fact, ever since the use of fire-resisting refractory material was practised by the profession. It cannot be maintained that the patented process would have suggested itself as a matter of course to any expert in the profession, when it is proved that, before the filing of the patent, nobody ever worked in the manner proposed.

The inventors of the patented process, by the advantageous application of known methods and arrangements, and in consequence of a happy and judicious choice of the same, have developed a novel and practical method of manufacturing gas. Taking also into consideration the results obtained, the inventors have achieved a technical improvement which appears to us in every way worthy of a patent.

The former finding of the Court must, therefore, be reversed and the appeal allowed. The costs must be dealt with according to section 33 of the Patent Laws.

TRAINING AND WORK OF CIVIL ENGINEERS.

Extracts from the Presidential Address of Mr. Arthur Valon, Assoc.M.Inst.C.E., to the Society of Engineers.

At the Meeting of the Society of Engineers last night, the PRESIDENT (Mr. Arthur Valon, Assoc.M.Inst.C.E.) delivered his Inaugural Address. It was devoted largely to questions bearing upon the education and work of men engaged in the various branches of engineering.

The President began by pointing out that the rapid development of engineering science and its application to the industrial problems of a complicated civilization has made the saying that "we are all specialists" no longer a rather exaggerated description of a general tendency, but the simple statement of an obvious fact. But he said it was not only in engineering that there was this tendency to confine a man's energies within an ever-narrowing circle. It could be seen in almost every department of human activity. One way of reducing specialization was by taking knowledge on trust; but this was not a way likely to be considered legitimate by a professional man. The essential basis of a profession is personal service; and in proportion as occupation departs from this principle it becomes less of a profession and more of a business. The immediate cause of what may be termed over-specialization is the continually increasing mass of detailed knowledge which has to be acquired by personal experience; and this can be diminished by reducing the number of problems to which there are practicable alternative solutions. We require to select, to co-ordinate, and to combine the experience and knowledge that is scattered among separate individuals; and one method by which this can be, and, as a matter of fact, is being, done is by standardization. In this connection, reference was made to the large amount of valuable work accomplished by the Engineering Standards Committee.

Mr. Valon next directed attention to the fact that the last twenty years have seen an unprecedented extension in the application of engineering processes, and a progressive development of every form of engineering, the results of which are only comparable to those of a complete revolution. The effect of these changes on the *personnel* of the profession has been very great. When engineering was almost entirely a matter of practical experience, it naturally followed that professional qualification depended on this, quite exclusive of any considerations of general education. Now that the scientific principles underlying engineering practice are known, and rational methods of calculation and design are superseding those of empiricism, a complete knowledge of these principles and their application is necessary to an engineer if he is to be properly equipped for his work. The President was very emphatic in the declaration that "the man who works by rule-of-thumb—the so-

called 'practical man'—has had his day. He did much good work, and we do well to respect his memory. The future is to a different type, but still to the practical man.

The President then passed on to deal with the proper education of an engineer, and recalled the fact that ever since the Society had had a corporate existence this had been a subject of discussion. He expressed the opinion that the future engineer, until he is twenty-one years of age, will be occupied in acquiring academic knowledge, using the word "academic" in its normal meaning, and not in any derogatory sense. It is a matter of common experience that men of learning are seldom men of action—that there is an apparent incompatibility between learning and doing; or it may be more accurate to say the bent of mind best able to learn is not that most likely to excel in action. While most occupations in life consist of doing rather than knowing, this is more obviously true of engineering than of any other profession. Mr. Valon says engineers have always recognized this; for it is at the bottom of their sometimes vehemently expressed conviction of the importance of practical experience. And in spite of the popular tendency to attach a disproportionate value to degrees and diplomas, they still maintain that these are only evidence of knowledge (not always even that) and never of executive fitness, which is the true end and aim of an engineer's training.

There are three heads, according to the President, under which the most obvious, if not the whole, of a professional man's material interests may be grouped, and these three may all be included under the one word "employment." First, to obtain it; second, its remuneration; and, third, its conditions. When a man has completed his training, unless he is very fortunately circumstanced, he is immediately confronted with the problem of obtaining employment; and he finds that he is almost entirely dependent on his circle of acquaintances for information as to any openings which may be available. There may be plenty of opportunities for congenial work, if he only knew where they were to be found; but, in the absence of a recognized medium of communication between prospective employer and employed, he has to be content with what happens to be nearest to hand at the moment, which may not be by any means that for which he is best suited. Frequently employment of an inferior kind at a small salary must be accepted—temporarily, it is, of course, hoped—in order to provide means of subsistence until a better opening presents itself. The result is that in many cases years are sometimes wasted before reasonably suitable employment is obtained. The interest of the employer, whose support is necessary to the success of any scheme, lies in obtaining a man with the qualifications he requires more easily and certainly than in any other way; and it is because there has hitherto been no such inducement that employers have not made extended use of the limited facilities afforded by existing societies. That employers are quite ready to avail themselves of a system which meets their requirements reasonably is shown by the experience of one of the Universities, where an Appointments Board exists to recommend men desiring to enter the business world to employers having positions to offer. So successful has this Board been, that the number of positions open is greater than that of men suitable to fill them.

Another proposal to which attention was directed by the President was that, by statutory registration, engineers should be placed in a similar position to that occupied by members of the legal and medical professions. He pointed out that there has arisen in recent years a widespread conviction that, while it is all very well to lay down elaborate systems of education which are believed to be necessary for those aspiring to become engineers, and to provide every opportunity for engineers in practice to keep themselves abreast of scientific progress, it is only reasonable and proper to ensure that those who have spent time, energy, and money in qualifying themselves thoroughly for their work shall not, at the end of it all, find themselves in no better position than unqualified persons who have done none of these things. Mr. Valon considers the grievance is a real one, for which some remedy ought to be found. If the welfare of the engineering profession is vital to the community, as he endeavoured to show that it is, and if registration will assist in increasing it, there are good grounds for demanding its establishment. It can, however, he thinks, be accomplished only if engineers themselves are united in considering it to be desirable, and their wishes are effectively presented, either by a combination of all existing institutions, or by some organization which would devote its energies to this and allied questions. But it cannot, he considers, be too strongly insisted upon that such organization is protective and not aggressive.

The President next proceeded to show that the welfare of the country generally is intimately connected with that of the engineering profession, and concluded with the following remarks: "Hitherto the development of engineering science has been directed by its almost exclusive use for economic ends. The effects, good and bad alike, upon social conditions, great as they have been, are but an indirect consequence. It is not unlikely, judging by the apparent trend of thought, that in the future all our resources will be used more directly to deal with such questions. May we not hope that by further lessening the time and labour required in production and distribution, by substituting mechanical power for brute force, by the further utilization of waste products, and the destruction of those that are noxious—in short, by a better application of the great forces of Nature to the use and convenience of man, the future progress of engineering science may enable the community to ensure a proper standard of civilized life to every one of its members?"

LONDON AND SOUTHERN JUNIOR ASSOCIATION.

Annual Dinner.

A party of about seventy sat down on Saturday evening to the fifth annual dinner of the London and Southern District Junior Gas Association. The Cannon Street Hotel was once more chosen for the function; and once more the choice was justified. As will be noted from the names of speakers referred to below, there were a number of visitors present; and the remarks made by them showed how thoroughly well appreciated are the aims and the accomplishments of the junior organizations of the gas industry. The speeches were interspersed with music and song; and in this connection special mention should be made of the great indebtedness of the members to Mrs. Winslow, the wife of the President, for some excellent contributions to the programme, all the items of which were much enjoyed. Mr. P. J. Smithers and Mr. J. Hewett acted as Stewards; while Mr. Hal Burte presided at the piano. The chair was occupied by Mr. D. J. Winslow, of Lea Bridge, the President of the Association.

The Loyal Toast having been honoured, the PRESIDENT proposed "The Association," pointing out that its growth had synchronized with a period of very great progress in the gas industry. It was well recognized now that it was necessary for young men to attach themselves to one or other of the junior associations. As to their own Association, at the time of the annual meeting in May last there were 152 members; and since then 55 more had joined; while three others were at the moment awaiting election. There appeared to be a great future before the gas industry; and he liked to think that the realization of this future would be assisted in no small measure by the different junior associations.

Mr. J. E. HENWOOD, in response, said the Association was indeed in a flourishing condition, with a membership of about 200, drawn from 33 gas companies in London and its immediate neighbourhood. For much of their success they were indebted to the help given them by the leading men in the industry, who, in spite of the busy lives they led, were always ready to sparesome time for the benefit of the Association. They were also fortunate in having such good men to control their affairs.

Mr. E. W. BROWNING, who also replied, contrasted the state of affairs now with that which existed in years gone by. He pointed out that his experience of the industry was a long one, for he would very shortly complete fifty years' service with the Gaslight and Coke Company. He felt that the young men owed a deep debt of gratitude to those who founded the Junior Gas Associations. They had seen what mutual help could do, and was doing. Those in the humbler ranks had great advantages at the present day. They had books on every subject, and were able to co-opt other brains into their own.

"Our Patrons" was submitted by Mr. S. A. CARPENTER, the Senior Vice-President, who remarked that the gentlemen included in the toast were the rock on which the Association was built. Without them it could never have occupied the prominent position it did to-day.

Mr. A. F. BROWNE, in response, expressed his high appreciation of, and sympathy with, the work of the Association, and his pleasure at the way in which this work was done. So far as he could see, the gas industry at the present time appeared to be going stronger than ever. The one thing which stood in their way was the inflated price of coal. But in the past periods of exceptionally high prices had been only temporary; and it was to be hoped that this occasion might prove no exception to the rule. Apart from this, everything was full of promise. They had the Institution of Gas Engineers, the Society of British Gas Industries, and the British Commercial Gas Association all under the presidency of a gentleman whom they delighted to honour; and perfect harmony and brotherly feeling existed from one end of the profession to the other. It was a most favourable omen for the future. Every young man on the technical side of the industry ought to join one of the Junior Associations. They were aiming at supplying a gas of uniform quality, and, as far as possible, of absolute purity; a gas which should be sold at the lowest possible price; and a service that should be the best for the consumer, in order that he might have the most efficient appliances for providing light, heat, and power. These were the things they must all keep in view.

Mr. E. PILBROW, whose name also was coupled with the toast, assured the members of the pleasure that it always gave him to be with the Association.

The next toast was "The President," which was proposed in apt terms by Mr. J. G. CLARK, who emphasized the remarkable zeal shown by Mr. Winslow in carrying on the affairs of the Association, and the excellent nature of his Inaugural Address, which had taken them into a comparatively unexplored field that would certainly place another weapon in the hands of the gas industry with which to fight its competitor.

In making his acknowledgment, the PRESIDENT said one appreciated being at the head of such an Association, because the members were so enthusiastic. Really, the President had very little to do, with such a hard-working Hon. Secretary as Mr. Ernest Scears and a Council who worked as harmoniously as theirs did.

Mr. E. G. STEWART, the Hon. Treasurer, in a happy speech, proposed the toast of "The Visitors"—coupling with it the names of Mr. Cross, as representing the manufacturing side, and Mr. Dodimead, of the service branch.

Mr. F. W. CROSS, in response, remarked that he was proud to see his Assistant occupying the chair of the Association, and to know that Mr. Winslow was valued so highly by his colleagues. He was pleased that their organization was so flourishing; for he believed it was only by the aid of Associations of this character that they got the best value out of men. Of especial use were the informal meetings, when they could talk over matters between themselves. He referred to the editorial in the "JOURNAL" for Feb. 18 (p. 443), where allusion was made to the address of Mr. Charles Carpenter to the proprietors of the South Metropolitan Gas Company, and it was remarked that the key-note of this address was "good service." It should be remembered

that this service was to a great extent given by the juniors. It was the juniors who came into touch with the public more than the chiefs, and thus they could render very valuable service to their companies. The more they thought of the word "service," and all that appertained to it, the more they would appreciate what they had to do to obtain the confidence of the public in the work of the company. It was the juniors mainly who had to remove any prejudices that might exist in the minds of the public. They were fast being removed; and his hearers could do much to complete the process.

Mr. H. DODIMEAD recalled the fact that it had already been his privilege on two or three occasions to meet the members at the headquarters in Westminster and show them the high-pressure lighting arrangements with which he was specially connected. He said he would be only too pleased to do the same again, if at any future time another similar visit was planned.

The remaining toasts were "The Secretary and Treasurer," submitted by Mr. J. HEWETT, and "The Press," which was proposed by Mr. W. J. LIBERTY.

MODERN PROBLEMS IN ILLUMINATION.

In his final lecture at the Polytechnic, Regent Street, on Friday, Feb. 21, Mr. J. S. Dow dealt with "Some Examples of Modern Lighting Problems."

In the previous lecture, he had shown how, by the aid of the polar curve of light distribution from a lamp equipped with a reflector, one could calculate the illumination on a table a certain distance below it. In the same way, by a slightly more elaborate calculation, one could determine the horizontal illumination at any distance from the foot of a lamp-post. Mr. Dow worked out the following formula by which this could be done:

$$\text{Illumination } I = \frac{I_\alpha}{h^2 + d^2} \cos \alpha = \frac{I_\alpha}{h^2} \cos^3 \alpha$$

Where I_α = intensity at an angle α to the vertical.
h = height of lamp.
d = distance of point considered from a point immediately below the lamp.

Simple graphical constructions could be derived by means of which the curve of illumination could be plotted-out. Having got these data, it was quite a simple matter to arrange the distance between two lamps so that the illumination between them did not fall below a certain value. In practice, one could go further still. Knowing the exact distribution curve obtained; and from a certain source in a given reflector, one could deduce spacing rules providing for the lamps to be arranged at a distance apart equal to a certain multiple to their height, so as to get even illumination of a certain value. When these rules were adhered to, one knew that with a certain consumption of energy a certain definite illumination would be produced. Data of this kind were becoming much appreciated, because the tendency now was to ask for the provision of a certain illumination. The tests carried out on behalf of the Home Office by Mr. D. R. Wilson were based on this method.

Proceeding, the lecturer dealt in turn with a number of practical problems, illustrating his remarks by a great variety of slides. After referring to some common mistakes in private house lighting, references were made on school and library lighting, a distinction being drawn between the conditions required in a general reading-room and a reference library for the benefit of students. In the same way, in the case of shops one found two distinct classes of work. Sometimes the windows were intended to be a complete catalogue of goods, showing practically everything to be found inside the shop, and had to be lighted accordingly; in other instances, the idea was rather to show a few special tasteful goods, and to change the contents of the window frequently. In the latter case, more artistic lighting was possible, and illumination by hidden lamps on the same plan as that practised on the stage was becoming very usual.

In restaurants, again, a distinction must be drawn between what may be termed a casual trade (people dropping in for a cup of tea or a chop, &c.) and the refinement of dining-out—in a restaurant that laid itself out to give a table d'hôte. Local lighting in alcoves giving soft effects, and the use of tasteful silk shades, would be aimed at in the latter case; while for the casual trade, it was more usual to provide a bright, general illumination all over the room.

Subsequently Mr. Dow briefly dealt with the lighting of factories, railway platforms, passages, &c.—making special reference to the methods employed on the underground railways. It is interesting to notice that when the City and South London tube was first opened (about 1891), the illumination on the platforms was apparently about 0·05 foot-candle. On many modern railways, more than twenty times this value would now be provided. Yet, when the trains began to run on this pioneer tube, all the newspapers referred to the illumination as brilliant in the extreme. Standards of illumination and comfort have risen enormously.

In the concluding portion of his lecture, Mr. Dow touched briefly on the problem of modern street lighting, which he stated had hardly been scientifically threshed out as yet. Originally the function of street lighting was to make the streets safe—to act as a precaution against evil-doers. More recently, the requirements of street lighting have quite changed. Probably the function of enabling fast-moving traffic to travel in safety is now one of the most important. The difficulty was to compromise between the problem of avoiding glare and securing even illumination with lamps spaced comparatively far apart. There seemed an opening for more scientific forms of reflectors and shades for street lighting. Some work in this direction had been done by Mr. Haydn T. Harrison in this country, Mr. Sweet in America, and others. As an example of the amount of illumination necessary, the lecturer quoted Mr. Harrison's data as follows:—

Country roads	0·005 foot-candle
Side streets	0·01 ,, ,,
Main streets	0·05 ,, ,,
Main thoroughfares . . .	0·10 ,, ,,

Reference was made to the work of the Joint Committee who had attempted to draft a standard specification on street lighting, Mr. Dow remarking that the whole question would be discussed by Mr. A. P. Trotter in a paper before the Illuminating Engineering Society, the Institutions of Gas and Electrical Engineers, and the Institution of County and Municipal Engineers on April 15.

SCOTTISH JUNIOR GAS ASSOCIATION.

EASTERN DISTRICT.

Visit to Cowdenbeath.

There was a large turn-out of members of the Association at Cowdenbeath on Saturday, to inspect the works of the Cowdenbeath Gas Company; and a very pleasant time was spent.

The Cowdenbeath works, for their size, are possibly one of the best fitted-up plants in Scotland, handling, as they do, all coal and coke with the least possible manual labour. The works are situated on the main mineral line between the ports and the principal Fife coalfields. From this line, the delivery of coal is received by a siding. Hydraulic power is used for tipping the waggons into a hopper; and the coal is carried from there, hoisted to an elevated railway, and dropped through the retort-house roof into a large coal-store. From here, the coal is drawn from shoots into the charging-trucks on the stage-floor level. The coke, when drawn from the retorts, drops into bogies in a subway, and, after quenching, is raised by hoist to the elevated railway, and put through a revolving screen or else tipped on the store-heap. Further particulars as to the works appear in "Notes from Scotland" to-day.

A visit was afterwards paid to the Miners' Rescue Station, and the burgh electric station. The plant here, which is practically new, is only utilized for street lighting purposes; and power is derived from a Diesel oil-engine of 150 H.P.

After their tour, the company adjourned to the Crown Hotel for tea—Mr. J. B. Scott, the Manager of the Cowdenbeath Gas Company, presiding.

Mr. W. GEDDES (Vice-President of the Association), in the absence of the President, thanked Mr. Scott and the Directors of the Company, on behalf of the members, for their hospitality. Most of them, he said, had been agreeably surprised to find a works making somewhere about 40 million cubic feet so well equipped and thoroughly up to date. This proved conclusively that the Manager was one who kept abreast of the times. He did not forget also to voice their thanks to Mr. Stevenson, of the Miners' Rescue Station. In this connection he said he thought, as some of his friends had suggested, that the "Pulmotor" which Mr. Stevenson had demonstrated to them would be very useful in their gas-works, both from a humanitarian as well as a legal point of view. Mr. Baxter, the Science Master of the Beath Higher Grade School, and Mr. J. S. Rae, the Burgh Surveyor, had also been very kind to the Association. The latter had shown the members through the electric station. He had further to thank Mr. Scott's assistants for their attention during the afternoon.

Mr. RAE said he was pleased the Association should see their way to visit the electric station. They should have no fear about paying the visit, for the town was not a competitor of the gas-works, as it produced light only for the streets.

The CHAIRMAN apologized for the absence of Mr. W. Hulton, the Chairman of the Gas Company, who he hoped would soon recover from a serious illness. Visits such as they were paying that day were very educative. Things were seen that might with profit be copied, while others might as well be avoided. In Cowdenbeath, owing to the rapid growth of the town, they had sometimes had trouble in keeping pace with the demand for gas; and at the present time they were none too well situated in this respect, though they expected to be able to struggle through with their present carbonizing plant. Their visit had been wholly in connection with the manufacturing side; but he had to say that they were well advanced in the distribution department also. Practically every consumer had a cooker or a griller. There were 1400 free cookers alone in use; and slot-meters were predominant. He intimated that as the members were passing down the street, they would notice in front of the Gas Company's show-room a Keith lamp of 1500-candle power, belonging to Mr. Waddell, of Dunfermline—the first of its kind in Scotland. It had been a pleasure to have them in Cowdenbeath; and he hoped they would pay a return visit.

Mr. A. WADDELL, of Dunfermline, suggested that the Senior Associations might do well to accompany the juniors on these visits. He believed that Scotland would yet hold its own in so far as improving on the present methods of gas making was concerned.

Mr. H. O'CONNOR, of Edinburgh, said he thought that, after such visits were paid, a meeting should be held for the purpose of discussing what had been seen. The visits would thereby be made doubly useful. He described the visit as the most varied and interesting one he had taken part in for a long time.

With the usual votes of thanks, the meeting terminated.

HYGIENIC ASPECTS OF GAS.

Lecture to the Manchester Junior Gas Association.

About forty members of the Manchester and District Junior Gas Association met at the Manchester University on Saturday last, when the fourth of the series of University Lectures for the session was given by Principal J. W. Graham, M.A., of Dalton Hall College, Manchester; his subject being "Hygienic Aspects of Gas." Among those present were several of the members of the Manchester District Institution.

Mr. S. Meunier (Stockport) presided, and introduced Principal Graham to the members.

The lecturer began by referring to the fact that the hygienic value of gas is derived more from what it does not contain than from what it does contain; and the first part of the lecture was therefore devoted to the unhygienic consequences of the burning of raw coal. It was pointed out that what gas-works were required to do for us was the earlier part of the process of carbonization in the fire-grate, in which vapours, unburnt gases, steam, and little liquid envelopes containing tar, go up the chimney to make a mess, which in a gas-works would have yielded valuable tar and sulphate of ammonia. Two-thirds or three-quarters of the gases from the coal go up the chimney to worse than waste. He appealed to his audience as a body of technical experts with whom the cure for smoke rested, rather than with people who feel themselves helpless in face of the obstinate smokiness of coal. He congratulated them on belonging to a business which had in it also the hope of great benefits to mankind.

Town Atmosphere and Health.

Dealing with the atmosphere of towns, the lecturer remarked that we bathed in the air all the time, breathed its dirt into the delicate passages of the lungs—taking in six times the weight of air every day that we did of food and drink. We were creatures of sunshine by nature and heredity, and inevitably suffered when we were deprived of light under the modern factory system. The pale children and anæmic women of our towns were the creatures of bad air, aggravating overcrowding; whereas food and wages and sanitation were probably better in the towns than in the country. The people in the centre of a great city like Manchester were worn out ten years before their time as workmen, and lost 30 per cent. of their lives. Sunlight was also the most valuable and cheapest of all disinfectants. Most bacteria could not live long in it; and in the laboratory they would crowd under black paper to get out of the light.

The healthful quality of even the feeble actinic sunlight in our towns was also dwelt upon. The normal reading for Calcutta was about double the highest for Manchester on its sunniest days, measured by the quantity of iodine released under sunshine per hour from an acid solution of potassium iodide. The extreme record showed that in one day in the Arabian Sea there was as much health-giving sunlight as reached Manchester in six weeks of winter. In our great towns there was, on the average, during the winter only one hour per day of weak sunshine; and three hours a day all the year round was the average amount for Manchester, Glasgow, Bradford, Birmingham. and some other places.

Fog and Pulmonary Diseases.

The relation between smoke and fog was next carefully treated. Smoke caused fog by the carbon particles cooling the air, blocking the way of the sunlight, hindering radiation, and by the tarry substances in smoke covering every globule of fog with a thin sheath of oily deposit, which prevented its radiation. There were many striking figures of the death rate from pulmonary diseases after a period of fog. In London, in 1880, 3000 people more than usual died in three weeks; and in 1892, 1484 additional deaths in a week followed a heavy London fog. In Glasgow, in November and December of 1909, a careful comparison with the mortality in seven other Scottish towns free from fog showed that during these specially foggy weeks 677 people more than usual had died in the city of bronchitis, pleurisy, and pneumonia. Dr. Niven, of Manchester, had shown diagrams pointing unmistakably to the death rate from pulmonary diseases rising in the periods which followed a heavy fog.

Consumption was the disease of the poor and of the cities. Observations made for eleven years in France, and published in the international journal called "Tuberculosis," showed that the consumption history of every house in Paris, Lisle, Marseilles, and a few other places, had been watched, and that 10 per cent. of all the deaths from this disease in Paris had come from 1 per cent. of the houses, 800 houses—not poor nor otherwise insanitary, but dark; and the lower storeys were more prolific of the disease than the upper ones. From each of these large houses there had been a death from consumption every nine months.

Glasgow's Gas-Fire Crusade.

The Chief Chemist of the Glasgow Corporation had made, after a year's work, an elaborate report upon the question of gas-fires. He had reported that they were both healthy and pleasant. The feeling of dryness in the air with old-fashioned stoves was due to heating by convection—that was, by warming the actual air of the room from a hot, black surface. It was hot air, hungry for water vapour, which caused the dry sensation. But the radiant energy given from the fuel of the modern gas-fire avoided this altogether. He found the humidity of the rooms unaffected. He found also that gas at 2s. per 1000 cubic feet was, for all-day use, about 30 per cent. dearer than coal at 17s. 6d. per ton—taking no account of the labour, dirt, and inconvenience saved, the firewood, the filling of the coal-scuttle from the cellar and the emptying of the ashes and the dusting of the room, and the cost of storing coal and sweeping chimneys. On the whole, surely this balanced the account. For occasional use for an hour or two at a time, gas-fires had it in cheapness as well as comfort. The evenness and easily regulated temperature of a gas-fire were also dwelt upon. In analyzing the products of combustion that go up the chimney, he found that gas-fires, in addition to being free from soot and tar vapour, only sent up one-tenth of the gaseous impurities—sulphurous acid and carbon monoxide—that a fire produced. Similar results were mentioned from the analysis made in 1908 by the Coal Smoke Abatement Society.

A Warning and a Hint.

The lecturer advocated that gas fires and cookers should never be made without a flue to the chimney or the outside air, on account of the difficulty of properly ventilating small rooms. He had found in his own experience of seven gas stoves and cookers that there was not the slightest nuisance from any of them.

He thought that posterity would consider the taxing of light and sunshine by charging an artificially high price for gas, paying out of one pocket to put it into the other, would be one of the most serious criticisms which would be levelled in future against the local government of our day—its love of make-believe and its lack of statesmanship. To render a gas-stove just a little dearer than coal, when it might be just a little cheaper, and thereby turn the balance in the wrong direction in thousands of cases, was a public error of the first magnitude.

Coke for Domestic Purposes.

There were, however, two difficulties to be met before gas could supersede the use of raw coal for domestic purposes; and they could be met by a single solution. There was the persistent love of a solid fuel and its inviting cosy and pokeable fire. The cottages where the one fireside is also the place for cooking and for hot water was another source of need for a solid domestic fuel.

The other difficulty was the disposal of the residuals of any enormously increased gas manufacture. While there was no difficulty whatever in the disposal of any amount of sulphate of ammonia, and of a high quality tar, there would be the greatest danger of making the present gas coke a drug in the market. This could be avoided and a smokeless domestic fuel provided by the adoption of distillation at a low temperature and the provision of a coke containing from 10 to 15 per cent. of volatile hydrocarbons.

The lecturer appealed to the young engineers present to be ahead of the times, cast aside the conservatism which sometimes hung about the older men, and do something to produce and stimulate the demand for this product, which would achieve, with gas, the redemption of our country from smoke. The product could command whatever price was necessary. Even at 27s. a ton large quantities of coalite were sold by a private firm in Manchester, and after burning it at sixty fire-sides for six months, he had concluded that at not more than 20s. a ton it would be as cheap as coal at 16s. 8d.

He quoted from Professor Vivian B. Lewes an estimate of the total value of this low-priced coke and its residuals, according to which, while only 12s. 3d. per ton was charged for it and the better quality tar was only assumed to have the same value as the present high temperature gas tar, 1000 cubic feet of 20-candle power gas could be put into the holder for 4⅜d., as against the same quantity of 14-candle power gas at the present time at 10½d. The calorific value of the new gas was 750 B.Th.U., against 592 for the present gas, and having only 18 grains of sulphur per 100 cubic feet, as against 45 grains in the present product. The failure of coalite, as everyone knew, had cast no real discredit on the article itself. The engineers who had made it, and had learnt much in the course of their occupation with it, were still alive and well able to manufacture a better article than it had succeeded in being.

Following Professor Lewes, the lecturer pointed out how wasteful it was to distil at a high temperature, and so destroy compounds whose chemical energy was thereby wasted, in order merely to produce a greater volume of hydrogen and carbon monoxide—obtainable much more cheaply from coke and steam entering the retort as a dilution in the form of water gas. There seemed no doubt that the whole scheme, when worked in gas-works, was a commercial proposition, and one for which the times were crying out. He appealed to all gas undertakings not to stand in the way of this great hygienic reform by refusing to take a broad view of their duties. Doubtless improvements might still be found. Professor Hodgkinson had proposed that the coalite should be slaked with lime water, which would retain the remaining sulphur and turn it into sulphates in the ash of the fire-grate, and so be finally rid of the sulphur trouble.

Coal was completely coked at a temperature of 800° Fahr., and there was, therefore, no physical need for a higher temperature, constantly degrading the compounds left in the coke and the tar. The gas manager was anxious to gasify as much carbon as he

could. They desired the same thing, but wished to be allowed to gasify some of it in the fire-place. If petrol was to remain at its present high price, surely it is the merest good business to produce a tar from which benzol might be made.

In the domestic fires which he had run with coalite, the lecturer had some difficulty in keeping them alight if they were very small. He also found that his grates with solid bottoms were not very suitable for it, owing to the absence of a through draught, and that, therefore, on the whole, the new fuel should be a little richer in volatile combustible products than coalite had been. The amount of waste up the chimney from a coal-fire was estimated at 81 per cent.—much lower than other estimates which had been made. He felt that there should be careful ventilation of a room from which most of the ventilation through the chimney had been taken away. One advantage of this fuel was that it could be used with the millions of fire-places already in existence.

In Professor Vivian B. Lewes's new book on the "Carbonization of Coal" was a table showing that, on the average, at a distillation temperature of 400° C., 5000 cubic feet of gas and 23 gallons of tar with a low specific gravity were produced from a ton of coal, and at 900° C. 11,000 cubic feet of gas and 9 gallons of tar of a high specific gravity. But in the low temperature gas there was 21 per cent. of hydrogen and 66 per cent. of hydrocarbons; whereas in the high temperature gas there was 55 per cent. of hydrogen and 38 per cent. of hydrocarbons. In some instances, the hydrogen might go as low as 18 per cent., and the saturated carbons up to 68 per cent. in the low temperature gas. Finally, he believed that the smoke evil was the most curable of all our great national troubles.

DISCUSSION.

The CHAIRMAN said the lecture bristled with good points; and he hoped that the members would take the opportunity of asking questions upon it.

Mr. D. V. HOLLINGWORTH (Birchenwood), the President of the Association, also expressed the hope that members would contribute towards the discussion. He said the lecture would, undoubtedly, be of great use to them in their crusade against the continued use of raw coal. Some years ago he (Mr. Hollingworth) tabulated certain facts as to the amount of sulphuric acid which was produced and discharged into the atmosphere. If coal was taken to contain 3 per cent. of sulphur, it was clear that the whole of this ultimately passed into the atmosphere as sulphuric acid. In this case over 200 lbs. of sulphuric acid would be produced per ton of coal; whereas by the use of gas for heating, only one-third of the acid passed into the atmosphere, and even this during the combustion of the coke. Another aspect of the hygienic usefulness of gas, and one which he thought the lecturer had not dealt with, was the sterilizing effect of gas consumption on the atmosphere. In heating and lighting by electricity, there was none of this effect; whereas by heating and lighting by gas, for every cubic foot of gas consumed there were many cubic feet of air drawn from the fire or flame, and this gave perfect sterilization. This, of course, was due to the very high temperature of the flame in each case. He believed that figures had actually been worked out and cultures obtained of ordinary air and of air passing through a gas-flame. In the former case, the air was full of bacteria; while in the latter it was absolutely free from germs of any kind. If it was alleged against the use of gas for lighting that there might possibly pass into a room a certain quantity of perfectly harmless carbonic acid, it should also be remembered that it removed many of the deadly organic impurities which the air possessed. Dealing with the question of the abstraction of valuable bye-products, the speaker remarked that the members should not forget that the Automobile Association and other associations were looking very closely into the question of benzol in preference to petrol for motor purposes. This, he submitted, was another step in the right direction, whereby greater uses would be found for tar products.

Principal GRAHAM invited the members to tell him what they thought of his proposal for producing low-temperature gas.

Mr. J. M'NICHOLL (Warrington) expressed the opinion that if they commenced to make low-temperature gas they would only get half the quantity. This, he said, would largely increase the carbonizing plant and other units in connection therewith. He emphasized the point that gas was their primary product, and that coke was the principal bye-product. He, however, looking at the subject from a practical point of view, could not see that smokeless fuel would make much headway unless the Legislature compelled people to use it. [Laughter.] In this event, gas engineers would only be too pleased to step into the breach.

Principal GRAHAM said he thought the last speaker had rather "put the cart before the horse." The first thing to do was to find the smokeless fuel, and then talk about the Legislature. With regard to the point which had been raised as to additional capital expenditure for plant, he agreed that this would be necessary.

Mr. W. HILL (Stalybridge) said he was in cordial agreement with the President's remarks about the sterilizing properties of gas. In the Stalybridge district, some of the cotton-mills were lighted by gas and others by electricity. It had been found, both in the winter and during epidemics of influenza, that the number of people absent from mills where gas was used as an illuminant was considerably less than at those lighted by electricity.

Mr. JAMES TAYLOR (Mossley) said the lecturer had alluded to the production of coalite from a low-temperature coke. He had stated that gas engineers treated gas making only as a matter of paramount importance. To this, he (the speaker) rather took exception. The gas engineer of to-day was primarily a commercial man; and whenever he found an article of financial benefit to his undertaking, he would certainly advise its adoption. But gas engineers had never yet been satisfied that the production of high-grade gas by low-temperature carbonization was a sound commercial proposition. The Gaslight and Coke Company had experimented with charcoal fuel, but had found there was no considerable demand for it.

Principal GRAHAM: It is not the right article.

Mr. TAYLOR said probably the same thing applied to coalite. There were many people who had for many years used coke for domestic heating; and, judging by their experiences, it seemed to him that coke would do anything that coalite could do. It was quite as satisfactory a fuel—he himself had used it for long periods, and found it to be so—but it was not popular fuel; and this was a prejudice to be overcome. Whether coke or coalite was to be sold they, as commercial gas engineers, must first create a public demand for it.

Mr. W. L. HEALD (Preston) said although the lecture had in some cases covered ground with which they were familiar, it had awakened in their minds many thoughts which had hitherto lain dormant—things which they were occasionally reminded about in the Technical Press and at such gatherings as the present. He was glad Mr. Hill had mentioned the question of the health of cotton operatives working in mills lighted by gas and electricity. Millowners in the Preston district acknowledged, from long experience, that employees in gas-lighted mills enjoyed better health all the year round—to say nothing of epidemics—than did their fellow-operatives in electrically-lighted mills; and consequently there was less absence from work through sickness. They need go no further than their own works. A gas worker was generally a healthy man. He (the speaker) had been surprised at the way in which gas stokers retained their health even up to the age of sixty.

Mr. TAYLOR: Seventy.

Mr. HEALD said the lecturer had referred to the question of giving more study to the quality of tar. This was rather a difficult matter to control. They, as engineers, were, however, fully alive to the importance of securing the best prices for any exceptional quality they obtained. Tar was not treated as a haphazard bye-product. With regard to the question of mixing low-temperature gas or rich gas with water gas, they had all recognized its possibilities. Only that week he made 80,000 cubic feet of blue water gas, and let it out into the ordinary gas for three hours. He was very much surprised to find how little it reduced the illuminating power. As to the development of smokeless fuel, he certainly thought it was for them, as a body of progressive engineers, to put their heads together to solve the problem. If the demand for smokeless fuel or partially carbonized coal became general, vertical retorts would, in his opinion, stand a very poor chance of making it, on account of the trouble experienced in dealing with a half-carbonized charge. The difficulty was in getting the coke out of the retorts.

Principal GRAHAM, in the course of his reply, referred again to the question of a satisfactory smokeless fuel. He said if this difficulty could be overcome, and the Manchester Gas Department offered the fuel at a reasonable price, they would, in his opinion, immediately get a demand for it. But to-day no one was making it, and they could not get it. The interest taken in the subject by the citizens of Manchester, as a result of the Smoke Abatement Exhibition, was remarkable. Public opinion was, in fact, ready to take it up. He strongly believed it was a matter for the earnest consideration, in their own particular interests, of all gas undertakings.

On the proposition of Mr. W. ROGERSON (Bollington), seconded by Mr. T. W. SMITH (Heywood), a cordial vote of thanks was passed to the lecturer.

Mr. T. T. Mackie Lumsden, the Managing-Director of Messrs. James Milne and Son, Limited, left personal estate of the gross value of £1241.

The spring meeting of the Southern District Association of Gas Engineers and Managers will be held on Thursday of next week, the 13th inst., when the new President, Mr. H. O. Carr, of Wandsworth, will take the chair and read his presidential address. The dinner of the Association is fixed for the same evening.

M. Kobayashi, in the Science Reports of the Tokio University [Vol. I., p. 201], says an examination of specimens of thorianite indicated that there are two varieties of the mineral—one containing about 78 per cent. of thorium oxide and 15 per cent. of uranium oxide, a molecular ratio of thorium oxide to uranium oxide = 6:1; and the other about 60 per cent. of thorium oxide and 33 per cent. of uranium oxide, a molecular ratio of thorium oxide to uranium oxide = 2:1. Different results hitherto obtained may be explained by the assumption that mixtures of the two varieties in varying proportions were analyzed. Dunstan and Jones, it is said, described a thorianite from Ceylon rich in uranium, and expressed the view that in thorianites the thorium and uranium oxides are not in chemical combination, but are present as isomorphous mixtures. Against this view, the author points out that the simple molecular ratio of the two oxides can hardly be a coincidence; and that, while ignited thorium oxide is nearly insoluble in nitric acid, thorianite dissolves fairly readily, even after ignition.

TOWN'S GAS AND THE DEVELOPMENT OF ELECTRICAL ENERGY.

By F. H. G. Goodwin, B.Sc. Eng., London.

[A Paper read before the Manchester Junior Gas Association on March 1.]

It has for some time been my intention to bring forward for discussion at the earliest opportunity the subject of town's gas and the development of electrical energy. The contribution to the "Journal of Gas Lighting" for Feb. 11 last by Mr. C. H. Wordingham, M.Inst.C.E. (Electrical Adviser to the Admiralty and one time Electrical Engineer to the Manchester Corporation), has to a certain extent forestalled me; but it has served at the same time to bring the matter into prominence, so that the question is now ripe for discussion. Mr. Wordingham is no new advocate of the advantages of the direct-coupled gas-driven electrical generating set; for some years ago I tested, on behalf of the contractors, several of these sets built to his specification.

Advantages of the Electric Motor.

It is now generally conceded that the electric motor possesses inherent advantages for power transmission; and it behoves the gas industry to recognize this fact, and to accommodate itself to it. This does not by any means involve loss of business for the gas-works; rather does it mean, if the problem be tackled aright, increased and highly profitable output.

The demand for electrical energy has come to stay; and I am confident that it can be met in the most economical and satisfactory manner by the use of gas-engines working upon town's gas. Of course, the manufacturer of producer gas plant comes forward with his proposals for turning out cheap electrical energy. But the producer plant is not an unmixed blessing; and the unfortunate engine fed on this diet has often to recuperate itself on town's gas—where this is wisely connected as a stand-by. Ostensibly, the town's gas is only put in for starting-up purposes; but the gas-meter very often tells a different tale.

Reliability of Town's Gas Supply.

The reliability of the town's gas supply—there are no fuses to blow nor circuit breakers to operate—and the ever-ready supply of consistently uniform, clean gas of high calorific value are weighty points for the advocate of its use to put forward. Now if town's gas can be used economically for the production of electrical energy—and I am confident that it can—we must consider the possible spheres available for this use. There are three cases to discuss:

(1) Extended use of electric power on the gas-works itself.
(2) Private gas-driven electric generating plant for mills, factories, &c.
(3) The public supply of electrical energy.

Electric Power in Gas-Works.

Taking case (1), an extended use of electric power on the gas-works itself would result in great economy. There are many machines on gas-works which, in the majority of instances, are but indifferently served with power. The steam-eating propensity of the single-cylinder steam-engine is well known; and if all the energy loss in this direction, together with that from the inevitable leaky joints and packings, and the radiation from yards of steam piping be taken into account, the result would be quite surprising. Then, again, who has not experienced trouble with the hydraulic capstan, which invariably just fails to exert sufficient torque? Think of the transmission of power to this machine, the annual cost of repairs and breakdowns at the worst possible moment, and then consider an electric capstan, which can be made absolutely watertight, needs practically no attention, and which exerts a turning effort proportional to the work it is called upon to do.

A central gas-driven electric generating station on a gas-works holds out many advantages. The power supply to the various sections of the works can be accurately measured, and the costs allocated to the respective departments. The electric driving of the isolated plant liberates steam for other purposes, and, if carried out thoroughly, would remove the necessity for so much boiler plant.

On the Continent, electric driving in gas-works is adopted to a far greater extent than in this country, though even here its use is now being extended. The exhauster is particularly suitable for electric driving; the speed of the motor being automatically regulated. Further examples could be multiplied indefinitely; but enough has been said to show that there is a wide field on the gas-works itself for the use of electrical energy.

Private Gas-Driven Generating Plant.

In case (2), the private gas-driven electric generating plant is a most promising feature for development. Hitherto this business has been badly handled; and we must see to it in the future that when a works or mill proposes to adopt electric driving, at any rate the question of having its own gas-driven generating station is considered. It is not to our credit that, after having had a gas-engine drive for years, a works should clear out the engine and take an electric supply from the public mains. Surely this is the type of customer we must retain. He takes a gas supply in bulk as it were, and, once connected to the supply, the cost of reading his meter and looking after him is only the same as that of the 5-light meter consumer. Hence he is worth some extra trouble; and here is a point I wish to make. Have we not in the past rather neglected this bulk consumer? Once connected to the main, it has been no concern of ours whether his engine took 20 or 40 cubic feet of gas per brake-horse-power-hour. Mr. Wardell, in his paper before the Eastern Counties Gas Managers' Association in April last, on the "Efficient Running of Gas-Engines," brought forward the question of the periodical inspection of gas-engines, and showed conclusively the need for such inspection.

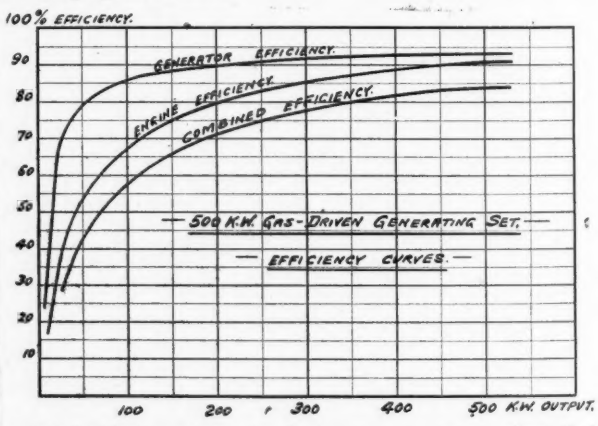
Of course, we can say the condition of the consumer's engine has nothing to do with us—well, that is where the electric motor gets in. Erratic pressure, too, has no doubt militated greatly against the gas-engine drive; but with the arrival of the high-pressure gas-meter, this source of trouble should be removed. I believe it would pay, and pay handsomely, for the gas supply authority to see to it that every gas-engine on its mains is maintained in an efficient condition. The manufacture of electric lamps holds before us the satisfied consumer as the limit of business success; and there is no doubt that a satisfied user is an excellent foundation on which to build the propaganda part of the business, and a sure augmenter of output.

Suppose, however, our consumer takes it into his head that the electrical drive will be more profitable. Shall we unresistingly allow him to throw out his gas-engine and take power from the electric supply mains? Surely we must put before him the advantages of having his own electricity supply station, and convince him that it will be highly profitable for him to use town's gas in order to obtain his electrical energy. Then, when he drives his generator by means of a gas-engine, we can leave him to install as many motors as he likes, and we should even be undisturbed were he to have electric light.

A Business Worth Cultivating.

I believe that to-day there is an excellent opportunity to exploit this business. The electric drive offers so many advantages—mills are putting in small electric motors for the individual driving of machines, and everywhere the cry is for an electric motor. If we supply the initial energy before the conversion, and we seize the present opportunity, then electricity will indeed have proved itself to be our friend and no longer our enemy.

Now this business will not be easily obtained. If the manager or director of a works knows little or nothing about calorific value or of kilowatts, he is usually very speedily able to reduce any proposed scheme to £ *s. d.*; and if the representative or the canvasser has not got his head screwed on the right way, he will return from the interview very much damaged. Even if we get the business, there remains the problem of carrying it through. And this is even more important; for if we make an error of judgment here, the news will be speedily noised abroad, and further progress is barred.



It is highly important, when laying out a new power plant, that the units are put in neither too large nor too small. The curves in the diagram show the importance of putting down machines of right capacity, for if they are underloaded the efficiency is much reduced. Competition is too keen nowadays to admit of the needless throwing away of even 1 per cent. in efficiency. It necessitates very careful thought and observation to choose the correct size of prime mover; for herein may lie the difference between success and failure. On the other hand, the plant must not be put down too small, or trouble occurs from breakdowns, inability to meet peak loads, &c. The size of the generating set is an especially important factor, for the combined or over-all efficiency of the set is the product of the engine efficiency and the generator efficiency. It is to neglect of points such as those referred to that I believe any non-success of previous schemes has been due.

The full consideration for this problem would take too long now; and I must defer the questions of load factor, electrical supply pressure, the use of accumulators, whether three-phase or continuous current, &c., until another occasion. Incidentally, I may say that the three-phase system offers many advantages, and that it is adopted to a considerable extent in gas-works abroad.

Public Supply of Electricity.

(3) Coming to the final case—that of the public supply of

electrical energy—there seems a strong opinion at present in favour of gas authorities adding this to their existing business.

Estimated Cost of Electricity from a Gas-Driven Generator Set—50 kw. Direct-Coupled.

Combined efficiency of set taken at 81 per cent.
Brake-horse-power of engine = 74·5.
Cost of gas per B.H.P. hour at 18 cubic feet per B.H.P. hour and gas at 1s. 9d. per 1000 cubic feet = 0·56d.
Units generated per annum, working 2600 hours = 130,000.
Gas consumption per annum = 3,484,000 cubic feet.
Cost of the gas-engine and generator, including erection, &c. = say, £800.
15 per cent. of this for interest, depreciation, &c. = £120 = 0·22d. per unit.
Therefore total cost of energy per unit = 0·56 + 0·22 = ·78d.

The arguments in favour of this course are well set out in the article by Mr. Wordingham referred to above. They are briefly these:

(*a*) Utilization by the gas authority of its acquired knowledge of the district.
(*b*) Establishment charges reduced.
(*c*) Economy due to the use of larger plant.

Whether anything will come of this proposal remains to be seen; but the outlook is certainly very promising.

Perhaps this last case is the most important of all, for the combination of gas and electricity supply means immense expansion of the gas industry.

If we can get the price of gas down to a lower level for bulk consumers then there is no fear but that the gas-engine will, in the near future, hold and more than hold its own, with profit both to the gas and the electricity business.

When the paper was read, at the evening meeting of the Association, there was only a small attendance of members. Mr. Hollingworth, who was in the chair, said that, under these circumstances, it would perhaps be better to have an "informal chat" among themselves. This course was agreed to; Messrs. Alsop, Heald, Hill, Hollingworth, and M'Nicholl taking part in the proceedings.

At the conclusion, a very hearty vote of thanks was passed to Mr. Goodwin on the proposition of Mr. Alsop, seconded by Mr. M'Nicholl.

MICROSCOPIC STRUCTURE OF COAL AND ITS CONSTITUENTS.

In the report of the proceedings at the annual meeting of the Manchester District Institution of Gas Engineers which appeared in the "JOURNAL" last week (p. 534), it was mentioned that Mr. JAMES LOMAX, of Bolton, read a paper on "The Microscopic Structure of Coal and its Constituents." The subject was illustrated by a large number of lantern slides on the lines of the diagrams given in the "JOURNAL" for the 3rd of December last, in connection with Mr. Samuel Glover's interesting notes on the study of coal sections, at the preceding meeting of the Institution, at which, it may be remembered, Mr. Lomax and his son were present. The following is an epitome of the paper.

The author explained that the main object of his communication was twofold—viz., first to bring under the notice of the members the principal features found in a thin slice of coal when examined with the microscope, or even with a low-power lens or magnifying-glass; and, secondly, to direct attention to the various bodies, both organic and inorganic, found in, and associated with, seams of coal. These bodies are very variable as to size, shape, ornamentation, and colour, in accordance with the position and quality of the coal in the seams in which they are found. Mr. Lomax said he did not intend to go into the chemical composition of coal, further than to indicate when there is a predominance of a species, and its general effects as to inflammability and gas-producing power.

Coals may be divided into three groups—viz. (1) sapropelic, coals formed in or under water; (2) humic, those formed from decayed vegetable matter; and (3) sporific, those composed of the remains of the fructiferous organs of the giant lycopods of the carboniferous times. These, again, could be subdivided according to the alteration they may have undergone subsequently to the deposition of the original vegetable *débris*, and also according to the resinous matter alone, which must have had its origin from resinous exudations from the plants of that time.

The author explained the process of preparing a piece of coal for microscopical examination, and said his intention was to take a series of coals and make sections of them in the manner described for comparative examination. He took first the celebrated Boghead cannels, or the so-called parrot coals, which are very different in appearance from the ordinary coals used for domestic, steam, and gas purposes, and described their appearance when cut in sections and examined. During the past two years he has made a study of cannels from the English, American, and Continental coal measures, and he has come to the conclusion that all have originated under similar conditions, being deposited or else formed under water as members of a sequence of sedimentary strata—the yellow spots in them being definite organic bodies, but of what affinity it is difficult to determine.

Coming to the second group—the ordinary or humic coals—Mr. Lomax remarked that at the first glance it would appear that this coal can have little or no connection with the sapropelic varieties, previously dealt with; the outward appearance being so different. If a shaving is cut with a knife, it curls up, and has little or no cleavage face. The humic coals, on the other hand, have distinct cleavage planes or faces more or less at right angles to the bedding, and they soil the fingers when handled. When a piece showing the cleavage face is examined, there can be seen parallel bands of varying thickness—some bright and others dull looking. Occasionally thin bands of earthy matter and also of iron pyrites are to be seen. They are soft and friable. Coals from some seams fall quickly into slack and dirt; but others, though soft, stand the weather well. Those which fall quickly are, as a rule, pure humic coals; and those which contain large quantities of megaspores could be classed as resinous coals.

The author then described the composition of a few coals from well-known seams. The coal measures are divided into three horizons—the upper, the middle, and the lower. The middle coal measures are the most productive for all classes of coal in this country, the lower following; while in the upper there are few good seams. If an exhaustive and systematic examination of the seams is made, it will be found that great changes occur in flora between the deposition of the lower and upper seams. It will be found that in the middle coal measures the vegetation was much more prolific, and the carboniferous trees grew to a much larger size and greater variety, than in any other part of the carboniferous ages.

To show this a sample was taken from one of the lower coal measure seams, being more or less characteristic of the others in that division. The preparation was cut from a sample of Halifax soft bed, and was a soft and fairly good steam coal about 2 feet thick. An examination of the vertical section showed it to consist of a large amount of fine bands, some broad in comparison to others, some composed of fine laminæ which are the remains of leaves compressed together, others composed of a fine vegetable humus without lamination. This had probably been in a semi-pulp before carbonization. A section similar to this, when seen under the microscope, gives one a good idea of a seam, being composed of the pure humic remains of plants without the admixture of change caused by other bodies. The horizontal section shows a fine granulated substance only.

Ascending upwards and to the base of the middle coal measures, the well-known Arley coal is found. A section cut vertically from this will show a different composition from that of the last. The lower part is composed of a number of thin bright red and amber-coloured bands and patches, some very resinous looking, others like fragments of amber; while there can be found thin red streaks, sometimes showing structure, which are the remains of long flat leaves. In the upper portion there may be found both megaspores and microspores. The Arley is acknowledged to be a good gas-producing coal, not owing to the quantities of spores, but to the large amount of resin-like bodies.

The next seam in succession of any great importance is the Riven of St. Helens, or the Plodder of the Bolton district. This consists of three bands, only one of which (in the Bolton district) is worked. This (the middle) is about 2 feet thick, the lower portion (8 inches) being composed of resinous bodies. These are more or less oval in the vertical section and crowded together. In colour, the range is from a light to a dark red. The middle portion of the band is a pure humic coal, containing a great number of irregular cells or cavities, which have been proved to be gas cavities. The upper portion contains a good many megaspores. The Plodder is a seam that varies very much in places, and is a coal that is liable to spontaneous combustion.

Above the Plodder there is the cannel of the Bolton or 4-foot of the Wigan district. The cannel is a very variable seam. In some places it consists of a good thickness of cannel, and in others it has only a thin covering. In places the roof is a blende; the upper portion containing fish remains. The lower portion, or bottoms, is a semi-spore coal, containing large quantities of microspores and megaspores.

The author remarked that a full description of the various seams with their contents would take up too much space and time.

The Society of Motor Manufacturers and Traders, the Royal Automobile Club, and the Automobile Association and Motor Union have combined for the investigation of the question of substitutes for petrol; and a Committee of nine has been appointed for the purpose. At their first meeting last Wednesday, they appointed as their Secretary Mr. Stenson Cooke, the Secretary of the Automobile Association. The Committee will direct their energies chiefly to the practical aspects of the question, by endeavouring to discover where petrol substitutes are produced, and considering how production can be encouraged and increased.

WORKING OF SULPHATE PLANTS.

By W. Walker Atley, of Normanton.

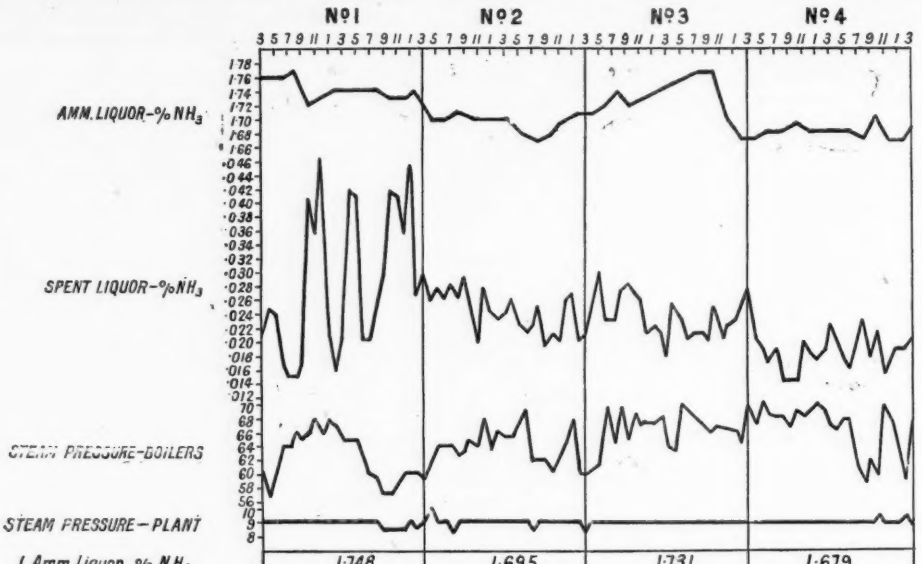
[Presidential Address to the Yorkshire Junior Gas Association, Feb. 22—see last week's "Journal," p. 522.]

I do not propose following the usual procedure in my Presidential Address, by occupying attention with words of advice or generalizing upon the latest developments in the gas industry. All of you are, no doubt, aware that the choice of a subject, to be of general interest, and at the same time instructive, is narrowed-down very considerably owing to the large number of subjects that are treated annually by members of the 21 Senior and Junior Gas Associations in the British Isles. We cannot but admit that, in the interests of the gas profession, the cause of this apparent difficulty in choosing a subject for consideration is to our mutual benefit—except, of course, to those placed in a similar position to myself.

Great developments have been made during the last few years in nearly all branches of the gas profession, among which I may mention coal carbonizing in vertical retorts, chamber and coke ovens, gas purification by means of oxide *in situ* and changing the purifiers in the reverse order, and the direct recovery of ammonia from coal gas without the use of elaborate plant, such as scrubbers, washers, &c. It is obvious that we all wish to be up-to-date as far as possible in having the best and cheapest methods of supplying gas and extracting the impurities therefrom; but owing to financial restrictions, most of us are prohibited from altering our existing plant and installing in its place apparatus of the latest design and utility. We must all be impressed, I think, and at the same time proud of our industry, which, through all the stress of competition and changes, has more than maintained its position—as is fully evidenced in a practical manner by the increased values of gas securities generally throughout the world.

As all of you are, no doubt, aware, my attention is devoted more particularly to the bye-products derived from coal; and the healthy state of the residuals markets has been most encouraging, in spite of the abnormally large increase derived from recovery coke-ovens in this and other countries. Many of you must have been impressed with the great strides that have been made in the production of artificial ammonia in various forms; and it is gratifying to know that, in spite of all this, the value of our chief ammonia product—sulphate of ammonia—is still maintained at a high level. I have recently had some experience in the working of ammoniacal liquor, particularly in regard to the liming, which I trust will be of practical use to you.

We have heard a good deal lately regarding the best way of



AVERAGES OF RESULTS	No 1	No 2	No 3	No 4
Amm. Liquor % NH_3	1·748	1·695	1·731	1·679
Spent Liquor % NH_3	0·0289	0·0238	0·0236	0·0179
Steam Pressure Boilers	61·3	63·6	66·2	66
" " Plant	9	9	9	9
B.O.V. Total Used	4-13-0	4-12-1	4-18-0	4-9-3
B.O.V. Cwt. per Ton S/Amm.	18·23	18·45	18·30	18·21
Lime Total Used	3-0-2	16-3-13	1-3-2-16	16-0-19
Lime Cwt. per Ton S/Amm.	2·55	3·373	4·41	3·29
S.Amm. Total Yield	5-2-0	5-0-0	5-7-0	4-18-2-13
Working Efficiency	Nil	18%	19%	38%

admitting lime to small and medium-sized sulphate of ammonia plants; and I wish to take this subject a step further by drawing your attention to some tests I have recently made on our sulphate of ammonia plant, with the object of arriving at the most economical limit at which to admit lime, in order to liberate the fixed ammonia from the ammoniacal liquor. The plant on which the experiments were conducted consists of the usual continuous type.

(1) A primary ammonia still, 5 ft. 9 in. square by 19 ft. 6 in. high, containing fifteen tiers of serrated hoods covering the openings through which the steam passes, along with the freed ammonia gas from the bottom to the top of the still, and thence to the saturator. The lower portion of the still consists of a chamber 5 feet high, into which the lime is admitted continuously, and kept thoroughly agitated with the ammoniacal liquor by means of a steam-injector, in conjunction with a perforated steam-coil.

(2) A second ammonia still, 5 ft. 6 in. square by 4 ft. 3 in. high, containing six tiers of serrated hoods similar to those in the primary still.

(3) Two solid lead plate saturators. These are in duplicate; only one being actually in use—to allow for any repairs to the other that may be required. There are also the usual ammoniacal liquor feed-tank and superheaters.

The sulphate of ammonia is discharged from the saturator by means of a steam-ejector into pitch-pine boxes suspended from an overhead runway; and after allowing sufficient time for draining, the tubs are tipped in the sulphate of ammonia store at any desired point. Settle lime, containing about 77 per cent. of calcium oxide (C_aO), is used on the plant; and the milk of lime, having a density of 3° to 4° Twaddel, is pumped continuously into the liming chambers at the base of the primary still by means of a combined agitator and pump. The average of a series of tests of the ammoniacal liquor showed it to contain 1·731 per cent. total ammonia, of which 26·36 per cent. was fixed.

In order to obtain the greatest accuracy regarding the control of the spent liquor, $\frac{N}{20}$ H_2SO_4 was used for testing; but the normal standard H_2SO_4 was employed in the case of ammoniacal liquor. Samples of the spent liquor were taken hourly, and the ammoniacal liquor every two hours. Steam pressures on plant and at boilers were noted every hour. Owing to the ammoniacal liquor being received continuously from several sources, it was impossible to determine the amount of liquor actually used during the experiments; but otherwise all the working conditions were perfectly uniform.

It will be observed that the four tests which are given in detail in the diagram each extended over a period of 24 hours, and differed from each other as follows:—

No. 1.	Small quantity of lime . . .	Low steam pressure
" 2.	Normal " " " . . .	" " "
" 3.	Excess of lime " " . . .	Normal "
" 4.	Normal quantity " . . .	" " "

In the first test, you will note the great fluctuations in the spent-liquor curve. The boiler steam pressure is low, and the ammoniacal liquor fairly normal. The low consumption of lime, together with the low steam pressure, gives a most unsatisfactory result. I

then decided to increase the lime to what I shall call a "normal consumption," keeping the steam at about the same pressure as in No. 1. The working is more even; but the ammonia content in the spent liquor is still too high, though it is 18 per cent. better than No. 1. As the slight increase in lime had shown better results, I was encouraged to make a still further addition of lime, and at the same time to increase the steam pressure as shown in test No. 3.

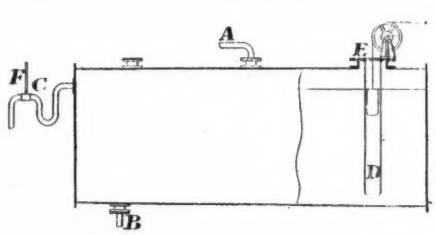
It will be observed that the spent liquor improved 19 per cent. upon No. 1, and is only slightly better than in No. 2, and has not warranted the extra quantity of lime and steam. It was obvious that the excess of lime was the weak point in this test; and in No. 4 it was reduced to practically the same amount as No. 2. This gave the most satisfactory test of the whole series. The spent-liquor curve was regular, and reached the minimum ammonia content, and showed an improvement of 38 per cent. upon the first test. The boiler pressure, you will note, is at the maximum, and the ammoniacal liquor is constant. The steam pressure on the plant throughout the tests remained practically constant—being, of course, carefully regulated by means of a reducing valve.

It will be noticed that the normal lime consumption is slightly above 3 cwt. per ton of sulphate of ammonia made. This is a little higher than that quoted by Mr. W. R. Herring, in his book describing the Granton Gas-Works. He states that the annual average varied from 2·6 to 1·5 cwt. per ton of sulphate of ammonia. The difference is probably due to less fixed ammonia in the Granton ammoniacal liquor, or a better quality of lime may have been used.

The irregularity of the curve in test No. 1 is very marked indeed, though the lime was continually pumped into the ammonia still; but it will no doubt compare favourably with those plants in which it is the practice to inject the lime intermittently. I am of the firm opinion that the heating of the milk of lime prior to entering the still is a distinct advantage. It will be readily understood that the secondary still cannot be working at its highest efficiency when the cold lime solution is continuously entering. In No. 1 it will be noted that, though there is a low consumption of lime, the steam pressure, and therefore temperature, is insufficient to free the ammonia from the spent liquor; whereas in No. 4, with a slight increase in lime over No. 1, but with a considerable increase in steam pressure, the most satisfactory results of the series were obtained. The increase of boiler steam pressure in tests Nos. 3 and 4 gave an increased temperature, thus liberating the ammonia more efficiently.

The conclusion of these tests points to economy by a considerable reduction in the quantity of lime required, providing an ample supply of steam is available. The fluctuation in the working of the plant is entirely due to the variation in steam pressure; and this is clearly shown by comparing the curves of spent liquor and steam pressure in Nos. 2, 3, and 4.

Another important point in connection with sulphate of ammonia manufacture is the storage of gas liquor. It is well known that the loss of ammonia due to evaporation in storage vessels open to the atmosphere is considerable; and no doubt a good many of the low yields of sulphate of ammonia per ton of coal carbonized which are occasionally published, can be attributed to this fact. Mr. J. T. Sheard, of the Sheffield United Gaslight Company, estimated that in 24 hours, with a still atmosphere, the loss of ammonia was from 3 to 5 per cent. upon the whole amount of liquor exposed. It will be readily understood that, if it is stored for a longer period—say, a few weeks—especially during such a hot summer as that of 1911, the loss would be considerable; and it is even possible to store liquor until it becomes so weak that it is quite useless for the formation of salt in the saturator.



Sealed Ammoniacal Liquor Tank.

The sketch shows a method of minimizing this loss, and has the advantage of being simple and inexpensive. It consists of a cast-iron or lead pipe D, running within (say) 6 inches of the bottom of the tank, and fixed to a flange E which covers the manhole. The tank is fitted with the usual inlet A, outlet to plant B, and overflow pipes C; and all other openings are made air-tight by means of flanges. The overflow-pipe has a U-shaped seal, fitted with a small vent-pipe F, to obviate any syphon action on the seal-pipes. We have now a storage tank, the contents of which are free from communication with the atmosphere, except for the small area contained in the pipe D. In case the temperature of the tank is raised, the ammonia gas that will be evolved is unable to escape, owing to the comparatively perfect seal; and it will be re-absorbed by the liquor on cooling. In the sketch I have shown a combination of the foregoing principle and an ordinary float-indicator.

GAS FOR HOT-WATER SUPPLY.

At the Meeting of the Junior Institution of Engineers last Friday, a paper dealing with the above-named subject was read by Mr. T. F. C. POTTERTON.

In his introductory remarks, the author pointed out that the subject of the supply of hot water for the modern household is, like other branches of domestic engineering and house equipment, daily having more individual attention—the tendency being to specialize in the various departments. He thought his audience would agree with him that the subject he was about to bring before them, with its ally—that of "Heating"—stood among the foremost of the improved conditions provided for the comfort and general well-being of the community. He then went on to show that apparatus for furnishing a supply of hot water covers a larger field than many people would appreciate who had not had the matter brought directly under their notice; there being numerous forms of appliances and kinds of fuel, all of which have their special use. It would be seen, therefore, that there is extensive scope for investigation and study by executing and consulting engineers who interest themselves in the subject. He was, of course, referring to the more important buildings of a residential character; as in many works, particularly in estates of a speculative nature, the proprietor or builder, for pecuniary reasons, leaves the detail to the contracting plumber. In such instances, little, if any, special consideration is given to the most suitable form of circulation and storage apparatus or kind of fuel to adopt. Of the latter, gas is now coming very considerably to the front, even for houses of moderate size. The ordinary terrace house, with a kitchen at the back, a sink in the adjoining scullery, and a bath-room with lavatory over it, does not present any difficulty; and in these cases either a tank system or a cylinder system is fitted. But in the better-class villa residences, bungalows, and country houses, built to the designs of architects, the services of engineers are more in demand; and the members of the architectural profession are now taking advantage of them. As an example of what he had been saying, the author reproduced, by permission of a firm of architects, the plans of a building which he thought would form a useful adjunct to his paper.

Mr. Potterton explained that when he was speaking of "circulating and storage apparatus" he was referring to cylinder systems, tank systems, and cylinder-tank systems, which are the most commonly used. With cylinder apparatus, the supply branches being taken from the expansion-pipe (or secondary circulation) above the hot-water storage and the cold-water feed into the base of it, any hot water in reserve, however small the quantity, is delivered at the tap without admixture of cold—assuming, of course, that the connections have been properly made; whereas the action of tank apparatus can seldom be depended upon to yield the full value of heat which the system con-

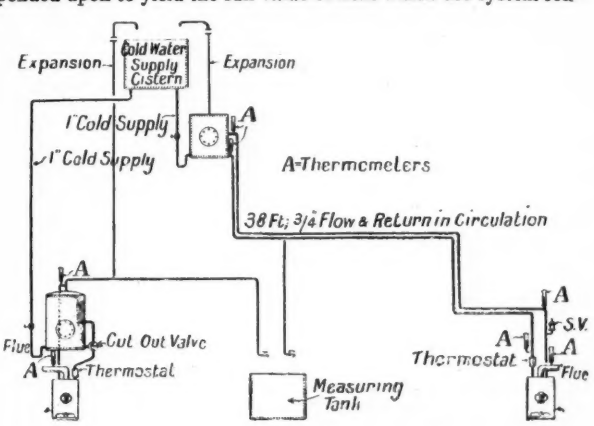


Fig. 1.

tains. The accompanying diagram (fig. 1) would, he thought, explain this. It represents, in simple form, the two systems referred to, and, in conjunction with the results of the tests (p. 604), will show the general working effect, so far as the creation of heated reserve goes, as well as the possibilities of drawing it. In each case the boilers were fired by gas, and the storage capacity was equal (20 gallons); the only differences being the length of the flow-and-return pipes and the arrangement of supply branches, which constitute the distinction between the two systems.

It will be noticed that in one instance the consumption of a given quantity of gas produced 20 gallons of hot water at 108° Fahr., compared with 87° Fahr. in the other; while hotter water in smaller quantities registered 150° and 110° respectively. This shows considerable advantage in favour of the cylinder system.

The other apparatus mentioned by the author as being commonly used—viz., the cylinder-tank system—is a combination of the two more simple arrangements; the upper storage being provided to make up any difference between the discharge and the incoming cold water, where several taps are likely to be used at the same time. An illustration was given of an instance where this might occur; and the author remarked that with a cold feed-pipe of 1-inch bore the upper storage would be of advantage, or perhaps

Tests of No. 18 "Victor" Boiler with Bunsen Flame.

Water temperature, 56° Fahr.
Atmospheric ,, 54° ,,
Gas consumption, 36 cubic feet per hour; pressure, 30-10ths.

Gas Lighted.	Temp. of Flow-Pipe. Deg. Fahr.	Temp. of Products Leaving Boiler. Deg. Fahr.	
7.30 a.m.	56	—	
7.50 ,,	153	140	
8.00 ,,	156	145	
8.15 ,,	161	148	Gas consumption, 27 cubic feet; 20 gallons of water drawn; hottest water, 150°; the whole in bulk, 108°.
First bath completed.			
Continuing—			
8.20 a.m.	—	—	
8.25 ,,	147	145	
8.40 ,,	155	145	
8.50 ,,	158	145	Gas consumption, 49 cubic feet; 20 gallons of water drawn; hottest water, 154°; the whole in bulk, 103°.

Water temperature, 57° Fahr.
Atmospheric ,, 59° ,,
Gas consumption, 34½ cubic feet per hour; pressure, 30-10ths.

Gas Lighted.	Temp. of Flow-Pipe. Near Boiler. Deg. Fahr.	Temp. of Flow-Pipe. Near Tank. Deg. Fahr.	Temp. of Products Leaving Boiler. Deg. Fahr.	
2.00 p.m.	57	57	—	
2.30 ,,	117	112	143	
2.46½ ,,	126	119	146	Gas consumption, 27 cubic feet; 20 gallons of water drawn; hottest water, 110°; the whole in bulk, 87°.
About 7 gallons of hot water left in top of storage vessel.				
First bath completed.				
Continuing—				
2.50 p.m.	99	65	146	
3.10 ,,	122	118	149	
3.25 ,,	133	125	153	Gas consumption, 27 cubic feet; 20 gallons of water drawn; hottest water, 122°; the whole in bulk, 95°.
About 7 gallons of hot water left in top of storage vessel.				

even a necessity. He considered, however, it would be better practice to provide the cold-supply pipe of sufficient bore to enable the secondary tank to be omitted, particularly in houses of moderate size.

The foregoing are all the ordinary systems. As examples of special installations, such as are necessary in the better-planned houses, Mr. Potterton said the two following subjects would apply. Architects frequently have a tendency, for which there are good reasons, to place the bath-room (or one of the bath-rooms) quite remote from the kitchen; and in such cases the adoption of an ordinary system is usually out of the question, particularly where a towel-rail is provided. The author showed an extreme case where at a house in Essex three baths exist, two being inaccessible with an ordinary secondary circulation, owing to the presence of the main hall between the bath-room and kitchen. In this case, therefore, the circulation had to be returned below the ground-floor level. To meet the case the storage is divided into separate vessels placed adjacent to the respective points of supply. The connections to the upper tanks are arranged upon the pocket system, by which means the hot water (being lighter than the colder contents of the system) collects in the upper parts of the respective tanks, and, these storages being jacketed, the heat is retained, and early baths rendered possible even before the fire is lighted. A large number of installations have been designed in this way, and where hot water is not maintained by night firing, the arrangement is considered a good one.

Another case illustrated was the hot-water equipment of a seashore bungalow at Bexhill. The building is planned as a single storey, except that advantage is taken of a little accommodation afforded by the high-pitched roof; but the bath-room and scullery being on the ground floor makes it a true single-storey bungalow from the hot water standpoint. The arrangement of one of the ordinary forms of apparatus for this building, therefore, is impossible, as a towel-dryer has to be provided in the bath-room, which is much below the level of a secondary circulation taken from the cylinder in the kitchen; and as the cold-water cistern is only slightly above the ceiling joists, a supply dropped to the bath from any such overhead circuit must be sluggish in delivery. A secondary tank could, of course, be adopted to overcome the inefficient outflow; but with a small range this could not work well in regard to time. The purpose has, therefore, been met by separating the supplies—one section being provided upon the simple cylinder system serving the scullery, and the other part of the apparatus having pocket storage with overhead circulation carried back beneath the ground floor. In apparatus of this kind, it is usual to effectively cover the piping with asbestos or other non-conducting composition; otherwise the heat loss by radiation would be excessive for the comparatively small range suitable for the building.

Gas as Fuel for Heating Water.

The author explained that the foregoing matter, although only touching the fringe of the subject, dealt with some of the foremost items to be considered in connection with the planning of domestic hot-water supply apparatus; and he then proceeded to refer to gas as a fuel, and its application to domestic hot-water supply. His remarks on this subject were as follows.

Although gas for heating water has been adopted from the first, it is only during the past few years that the extent of its adaptability and its numerous advantages have been realized. In this matter, I am referring to hot-water service from circulating apparatus, not to geysers or other forms of instantaneous water heaters. Gas-heated hot-water supply, however, is a thing of the present as well as of the future. The principal gas companies throughout the country realize this, and are fostering it with good results.

The main feature of advantage in domestic supply work which gas possesses over coal is its extreme flexibility to varying conditions and demands, in addition to which cleanliness and labour-saving qualities also count. The control of all properly-equipped gas-fired water-heating apparatus for domestic supply is done automatically by the use of thermostats, which is the crowning feature of the idea.

A warm bath of 20 gallons can be obtained in from 15 to 30 minutes (according to the rate of the gas consumption), starting cold, or smaller quantities of water for culinary purpose in proportionally less time and practically upon the same basis of fuel cost; whereas with a coal-range the time stated is barely enough to prepare and light the fire, without considering the dirt and surplus heat produced. When using gas—a concentrated fuel, which the process of manufacture and distribution naturally increases in value—it is necessary to observe economies which are of less importance, or one might say impossible of adoption, with coal-consuming appliances.

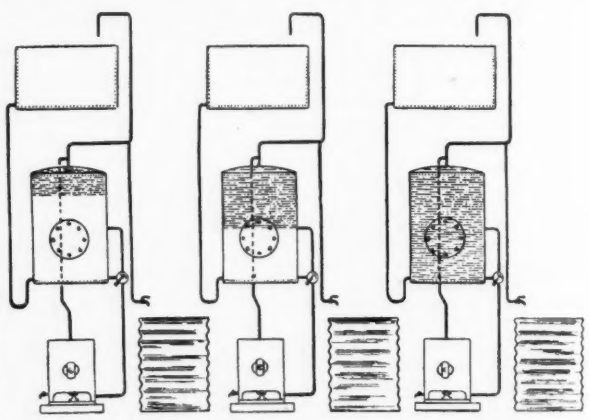


Fig. 2.

In fig. 2 is shown the most advantageous piping arrangement for general use in connecting gas-boilers to cylinder apparatus; the diagrams illustrating in three stages the working effect of the circulation. By this means hot water is stored in the upper part of the cylinder without admixture with the receding cold water; and thus so soon as any reserve is created, it is immediately available for use. To advance the utility of this quick effect, the pipe sizes of the circulation can be proportioned to govern the temperature at which the water circulates from the gas-boiler, so that the supply, however small in quantity, reaches a useful degree of heat.

This condition also bears in an important way upon the action of the thermostats, which, being in the return pipe, are unaffected until the full temperature is obtained throughout the system; for if the water circulated more quickly, and consequently at a lower temperature, the thermostats, being partly heated, would somewhat reduce the gas consumption after once circulating the contents of the storage, and would thus delay the procedure of the second heating necessary to raise the supply to a satisfactory temperature. The scullery sink requiring water of the highest temperature, it is usual in ordinary cases to regulate the supply to (say) 150° Fahr.; and having the apparatus constructed in the manner described, it is possible to obtain a few gallons of hot water and shut off the gas, without heating the whole, supposing no further demand exists for the time being. Another feature of economy adopted with the "Victor" apparatus is the provision for reducing the amount of water heated. This is effected by controlling the circulation of the lower half of the cylinder for which the valve in the return pipe provides, so that only 10 to 15 gallons of water, sufficient for culinary and lavatory purposes, is held in reserve, except when baths are in demand.

From 2 to 3 cubic feet of gas per gallon suffice to raise water to 150° Fahr., according to the time of the year and the initial temperature of cold water; so that consuming gas at the rate of 80 cubic feet per hour an average of 34 gallons of hot water per

hour would be available, or any larger quantity according to the boiler power. For such purpose the boilers are duplicated or erected in batteries; and as the working effect of each boiler is constant—subject, of course, to the gas supply being maintained—the result can always be relied upon.

Gas-boilers are frequently used as adjuncts to existing coal-range boilers; and for the early morning requirements they serve a very valuable purpose. In many large houses in the West End, the only difficulty experienced with the hot-water supply is the early morning baths. For this purpose, gas-boilers are specially suited. [The author showed this combination as usually fitted up; and a smaller installation which was a compromise between the tank and cylinder systems.]

Before closing, it may be of interest to refer to comparative tests of a coal-range and gas-boiler recently obtained in a private house near London. The domestic supply from the range was found generally inadequate, owing in a certain degree to the amount of heating surface contained in the apparatus and the long run of circulation, the principle of which is shown in fig. 3.

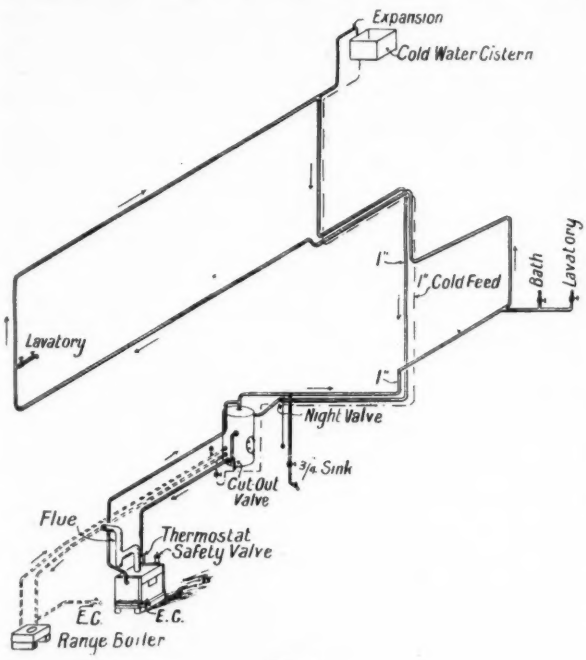


Fig. 3.

The kitchener was of the ordinary "open and close" type, with fuel chamber 9 inches wide, 8 inches deep, 9 inches high (lifting bottom grate), and was fitted with block boiler 5 inches high and 13 inches deep. The apparatus consisted of a 25-gallon cylinder with 26-feet run, 1¼-inch primary flow and return, and 157 feet of secondary circulation; the whole being uncovered. The gas-boiler shown is a No. 20 "Victor," and is connected upon the "Victor" principle previously described; the flow being carried into the secondary flow-pipe immediately above the cylinder, and the return from the side—provision being made for reducing the amount of water in circulation, when baths are not in demand, by the patent cut-out valve arrangement.

Tests of each method of heating were carried out upon identical principles, so far as the two fuels would allow, with the following results:—

Coal-Range Test (*Dec.* 9, 1912).

Time Fire Lighted.	Temperature of Flow-Pipe. Deg. Fahr.	Coal Used. Lbs.
10.20 a.m.		
10.23 ,,	49	7
10.43 ,,	—	3½
10.50 ,,	81	—
11.10 ,,	—	3½
11.20 ,,	109	—
11.22 ,,	(Primary return commencing to heat)	7
11.50 ,,	133	—
12.10 p.m.	(Circulation commencing in the secondary flow)	3½
12.20 ,,	142	3½
12.20 ,,	—	3½

Total fuel consumption, 28 lbs. of best kitchen coal.

Gas-Boiler Test (*Dec.* 11, 1912).

Time Gas Lighted.	Temperature of Flow-Pipe. Deg. Fahr.	
10.25 a.m.		
10.25 ,,	49	(Cut-out valve closed)
10.45 ,,	151	
10.51 ,,	153	(Secondary circulation acting)
11.10 ,,	157	(Secondary piping circulating freely)
11.20 ,,	159	
11.25 ,,	164	75 cubic feet of gas used
11.50 ,,	190	
12. 5 p.m.	197	50 ,, ,,
12. 5 ,,	—	(Thermostat shut down to a consumption of 8 cubic feet per hour)

Total gas consumption, 125 cubic feet

Water Temperatures Obtained (*2 Gallons Each*).

	12.23 a.m.	1.20 a.m.	10.55 a.m.	11.10 a.m.
Top lavatory	112°	126°	—	128°
Bath	118°	140°	120°	142°
Sink	130°	142°	148°	146°

The piping principle shown is far from ideal in many ways; the imperfect grading of the secondary flow and return and the large amount of heat-losing surface being the foremost points of consideration. Weakness also occurs in the arrangement of the secondary circuit; the flow having a longer horizontal run than return, so that the direction of the circulation is frequently reversed. At the same time, the system is of the average type commonly met with; and the instance shows in many ways how advantageously a gas-boiler can be employed. The kitchen boiler in full operation took just two hours to do what the gas-boiler performed in thirty minutes; and this alone means a very considerable advantage for early morning requirements.

One point to note in regard to the working of the gas-boiler is the high temperature reached in the primary circulation owing to the extended run of uncovered secondary flow and return. This necessitates a larger temperature difference in the primary connections at the boiler, as the thermostat finally operates at a given temperature, no matter what form of circulation is adopted. The heat of the water leaving the boiler is therefore at a considerably higher degree. To economize in heat losses, a night valve has been fitted in the secondary return pipe, which stops the circulation in this section; and with this valve closed the system would operate as an ordinary cylinder apparatus with expansion-pipe only. The thermostat would then control the water at about 160° in the flow-pipe, returning about 130°; giving an average mean temperature of 145° at the tap, which is suitable for all ordinary domestic purposes.

Extensions at Eastbourne.

Presiding at the meeting of the Eastbourne Gas Company, Dr. G. A. Jeffery pointed out that during the six months to Dec. 31 they had made a profit of £11,373. The quantity of gas sold was 247,800,800 cubic feet, as against 238,732,000 feet in the preceding six months, or an increase of 9,068,800 cubic feet. The gratifying results achieved had been mainly reached through the willing and praiseworthy efforts of Mr. J. S. Garrard (the Secretary), Mr. John Hammond (the Resident Engineer and Manager), and Mr. H. E. Jones (the Consulting Engineer). The Company were building a new retort-house which, when completed, would be equal to an output of a million cubic feet per day. A coal-store was also being put up. Then they were spending money in carrying the gas-mains to Westham and Pevensey. Finally, the Company were entering into a contract with the Railway Company to supply the station with high-pressure gas. A dividend was declared for the half year at the rate of 7¾ per cent. per annum on the "A" stock, 6¼ per cent. per annum on the "B" stock, and 5 per cent. per annum on the preference stock, which will absorb £8785, and leave a balance of £14,661 to be carried forward.

Cork Gas Consumers' Company.

Mr. George Lynch (Chairman) presided at the meeting of the Cork Gas Consumers' Company, and, in moving the adoption of the report and statement of accounts, said they had had a satisfactory half-year's working. Notwithstanding the severe competition they had to contend with, there had been a steady increase in the number of customers and in the quantity of gas sold. They had now connected with the mains 5273 prepayment meters—over 300 more than at the corresponding date last year. The ordinary meters numbered 4822, showing a considerable increase in the same period. During the past year they had sold or lent 337 gas appliances—including stoves for cooking, boiling, heating, or laundry purposes—which brought the total up to 10,057, in addition to which they had 3150 cookers and grillers fitted to slot-meters. The Company were now selling more gas than they did before the electric light was started in Cork. For the past two years, the increase had averaged more than 9 million feet. In answer to a question, he said the Directors had an idea that when the reserve was £10,000 they might start paying back-dividends; but the accounts only showed a reserve of £9000, and it was merely by the addition of interest on investments that they were able to bring it to £10,097. To pay 1 per cent. on back-dividends would take £1400 for a year. He thought they should wait for another six months at any rate. The report and accounts were agreed to, and a dividend was declared at the rate of 8 per cent. per annum for the half year to Dec. 31. Reference was made to the careful supervision of the Company's business by the Directors, and the businesslike manner in which the officials discharged their duties.

Development of Doncaster.—The great development of Doncaster through colliery enterprise is making its effect felt at the Corporation gas-works. Not only has a large new gasholder just been completed, but the works themselves are to be extended so as to make them equal to a supply of 750,000 cubic feet per day. The proposed extensions are to the retort-house and the coal-stores; and they will be proceeded with immediately the sanction of the Local Government Board is received.

Charge for Gas to Soothill.—The Batley Corporation have received a letter from the Local Government Board asking for further information concerning the increased gas charges. The inquiry is, it is said, due to the fact that when Batley asked for a portion of Soothill to be included within the borough boundary, a promise was made that the price of gas should be reduced in Soothill from 2s. 4d. to 2s. 1d. per 1000 cubic feet. Instead of a reduction, there has been an increase of 3d.; and Soothill ratepayers have appealed to the Local Government Board.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Abandoned Coal Export Tax.

SIR,—The attitude of your correspondent "Coal Fitter" reminds me very much of that taken up by London Gas Companies when the cost of coal went up some forty years ago. They promptly placed the entire extra burden upon their consumers, by raising the price of gas, so as to provide their shareholders with undiminished dividends. The result is history. Parliament very properly revised their powers of charge.

To-day the mine owners, holding the fuel supply of the kingdom in their hands, are asked by the consumer not to strain too greatly the advantage their monopoly gives them. There is no doubt that the owner and the foreigner shared between them the coal tax. But supposing they did not, suppose the whole cost was borne by the colliery proprietor! Why should he not?

The Italian Government, as "Coal Fitter" knows, in order to check the drain of works of art from Italy prohibited their exportation on the ground that they were national assets which could never be replaced. Coal is our national asset. The Premier likened it to the life-blood of the country. Its flow stopped at the command of the instigators of the great strike; but when it did begin to flow again, the starving arteries of Great Britain hungered for what was wholly theirs by right, while big streams poured out of the land and over Europe.

By all means let the foreigner have the coal we can spare beyond our own needs; but let something be added to the price he pays, to help us bear the increasing burden of providing ships and guns to protect for ourselves the land in which it is wrought.

CHARLES CARPENTER.

South Metropolitan Gas Company,
March 3, 1913.

The Unrestricted Coalowner.

SIR,—May I be allowed to offer some criticism on your leading article of the 11th of February, "The Unrestricted Coalowner," and also on Sir Corbet Woodall's speech?

I am not a coalowner, but have known the trade for a long time; and, like many others, I was surprised to read that, while the Gaslight and Coke Company had an improved revenue of £195,000—partly from coke and residuals—they yet want Government assistance to reduce the extra price they have paid for coal (amounting to £188,000), from which coal they obtained this extra income. Why should Government take money out of the pockets of coalowners and miners to further inflate the profits of the Company, who, by their monopoly, already enjoy a privileged position? Where is their merit, that they should have Government assistance to make more money at the expense of the coalowner and coal miner, whose wages form so large a part of the cost?

Now is it not a fact that the various gas companies in the United Kingdom obtain more for their coke, sulphate, and other bye-products than they pay for the coal—thus practically obtaining the gas for nothing?

In spite of Sir Corbet Woodall's complaints about the price of gas coals, nearly all the meetings of the gas companies report improved results for 1912. At the Newcastle-on-Tyne Gas Company's meeting, it was stated that, in spite of additional expenditure and a reduction in price, the gross profits were larger than twelve months ago.

Sir Corbet Woodall must be well aware that the strike of six weeks resulted in a heavy loss to the collieries, and that legislation has very materially increased the cost of production. It is generally maintained that during the whole of the period covered by the accounts reviewed by Sir Corbet coals were being delivered to the Gaslight and Coke Company far below the current price, and, further, that they were being carried far below the current freights. Does he want Government to interfere also to keep freights low for his benefit? Can it be denied that coal owners have had periods of great depression, and supplied coals to monopolists like gas companies at the bare cost, and sometimes under? Is he not aware that collieries require many years' expenditure of large sums of money without any return, before any coal can be vended; and is this to be done for the privilege of supplying gas companies at cost price?

It is a dangerous argument, and a Socialistic one, to require Government interference to keep coal prices down. Many people might think it would be as advantageous to expropriate the London Gas Companies, who have a monopoly, and whose revenue and profits are practically secured by Acts of Parliament.

Several municipalities produce their own gas and materially reduce the rates thereby. Such a suggestion as Sir Corbet Woodall makes brings somewhat prominently before the Socialists of this country the possibilities which exist for exploiting the gas companies who have made so much extra profit.

MERCHANT.

Newcastle-on-Tyne, Feb. 26, 1913.

Great Grimsby Gas Company.

SIR,—I thank you heartily—and I doubt not other shareholders in the Great Grimsby Gas Company will do the like—for the information conveyed by your report in this day's issue of the "JOURNAL" of some remarks made by the Chairman at the general meeting of the Company held last Friday.

Taking these remarks in their order of sequence, I note that the Chairman referred to my letter of January, 1912, in regard to the non-payment of the statutory dividend upon the £10 shares; and he said that the proper course—*i.e.*, for a shareholder who desired that the statutory dividend should be paid—to take would be to move an amendment to the motion regarding dividend. This is erroneous. The Company incorporates with its Provisional Order of 1885 and its Act of 1910 the provisions of the Companies Clauses Act, 1845, in regard to the making of dividends. The first of these provisions is as follows:—

> "Previously to every ordinary meeting at which a dividend is intended to be declared the directors shall cause a scheme to be prepared, showing the profits, if any, of the company for the period current . . . . and apportioning the same, or so much thereof as they may consider applicable to the purposes of dividend, among the shareholders . . . . and shall exhibit such scheme at such ordinary meeting, and at such meeting a dividend may be declared *according to such scheme.*"

It needs no elaborate argument to demonstrate the wisdom and equity of this limitation. Only the board of directors can know the precise commitments and the true financial position of the company; and a successful amendment to outstrip the bounds of the scheme might not only plunge the undertaking into difficulties, but even involve it in the illegality of having paid out of capital a portion of dividend unearned. Such an amendment is therefore out of order.

From your report the shareholders now learn for the first time that the price of gas was raised 2d. per 1000 cubic feet as from last June, which accounts for the reduction of the dividend upon the £10 shares to 9¾ per cent. for the last half of the year 1912. I think it is the invariable custom of directors of gas companies to communicate in their reports to the shareholders so important an act as a variation in the price. But not one word as to this was contained in the Directors' report of the 7th inst., and the shareholders were left to guess why the dividend should be reduced. It is much to be desired that the Directors should be a little more communicative in their reports.

It is almost impossible—nor would it be desirable—within the limits of a letter to discuss the question of the new capital reserve fund. Unfortunately, in my opinion, this fund was by the 1910 Act merged into, and amalgamated with, the general reserve fund, and the new capital thus lost the specially ear-marked fund which was all its own. The appropriations to and from the amalgamated fund present points of difficulty, and the obscurity is not relieved by cross entries in the accounts of sums transferred from profit and loss to reserve on the one side, and from reserve to profit and loss on the other.

By another clause of the 1910 Act, the Directors took power to abrogate the customary half-yearly meetings of the shareholders and to issue reports and accounts once in the year only. This is a regrettable innovation.

PERTINAX.

Feb. 25, 1913.

Coke-Ovens and Bye-Products.

SIR,—*Apropos* of your editorial remarks in reference to "Coke-Ovens and Bye-Products," in your current issue, I should like to draw your attention to the fact that, though you say "the interests of the two industries have now so much in common . . . that it is to their mutual advantage to make united cause," &c., I think the leaders of the gas profession and the Associations to which they belong have not yet extended the hand of friendship to their *confrères* engaged in the coke-oven industry.

Would it not be advantageous for the different Institutions of Gas Engineers to allow coke-oven managers to join their ranks, and so, by first fostering a spirit of friendship, also bring out those points (both technical and commercial) which may be of great advantage for the uture of both industries?

I feel certain that all coke-oven managers would only be too willing to have the opportunity of coming in contact with gas engineers; and there is no doubt that papers and discussions could be arranged which would be of benefit to all concerned.

If you think fit to publish this letter, it will probably lead to something further.

COKE-OVEN MANAGER.

Feb. 28, 1913.

Foreign Made Glass.—Referring to an editorial paragraph appearing in last week's issue of the "JOURNAL," commenting on the paper read by Messrs. Clark and Mackinney at the Illuminating Engineering Society, in which it was stated: "Then the glass makers were advised to step into the work of providing home-made and large-size glass bowls for semi-indirect lighting," &c., Mr. W. Fisher, the Commercial Secretary of "Holophane Limited," writes to ask us to point out that over 80 per cent. of the Company's material is made on the Tyne.

Midland Association Visit to the Coombs Wood Tube-Works.—Referring to the report in last week's "JOURNAL" (p. 522) of the visit of the Midland Association to the Coombs Wood Tube-Works of Messrs. Stewarts and Lloyds, Limited, the Helm Lamp Company write: "You state that the high-pressure gas-tubes which were seen waiting dispatch to our order had been tested up to 100 lbs. per square inch. We should, however, like to point out that these tubes are tested by Messrs. Stewarts and Lloyds to 600 lbs. water pressure, and that we ourselves, independently of this, in carrying out high-pressure contracts, test all mains after jointing, and leave them dead-sound at 100 lbs. per square inch."

Salisbury Gas Company.—Addressing the shareholders at the half-yearly meeting of the Salisbury Gas Company, Mr. George Fullford (the Chairman) said the sales, both of gas and residual products, for the six months to Dec. 31 showed a substantial increase as compared with the corresponding period of the previous year. The system of maintenance for outdoor and interior illumination continued to be a success, and the working classes of Salisbury had learnt the utility of the ever-ready gas-cooker and of the automatic meter. Small additions to mains had been made in two new districts. The past year had been in many respects an anxious one for the Directors and for the Engineer and Manager (Mr. N. H. Humphrys); but with the aid of loyal support from the office staff, the foremen of the various departments, and their large body of workmen, they were able to produce a statement of accounts that was, in his opinion, taking all the circumstances into consideration, eminently satisfactory. The new sulphate of ammonia apparatus erected last year was an entire success.

REGISTER OF PATENTS.

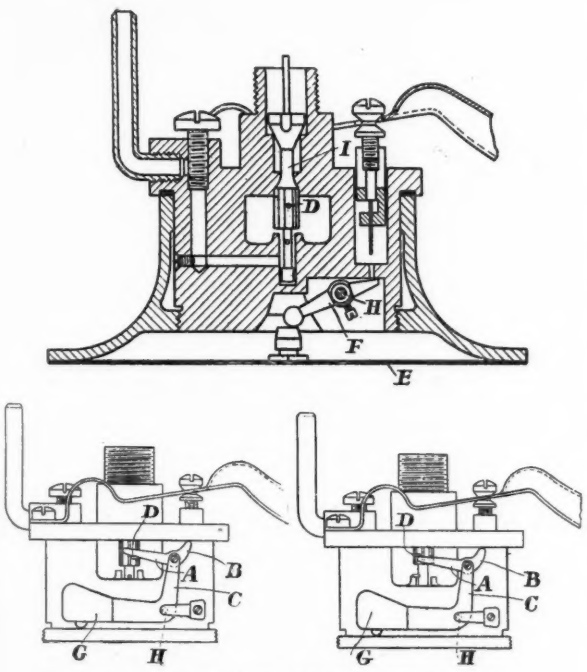
Lighting and Extinguishing Gas-Lights from a Distance.

AKTIEBOLAGET LUX, of Stockholm.

No. 2232; Jan. 27, 1912. Convention date, Feb. 23, 1911.

This invention relates to improvements in apparatus for lighting and extinguishing gas-lights from a distance described in patent No. 1285 of 1912.

In the earlier apparatus, the valve controlling the lighting and extinguishing of the main and the pilot flame is directly moved by a lever system operated by a diaphragm actuated by variations of pressure in the gas-conduit. For this purpose, one of the levers of the system engages in grooves in the valve, and imparts (by the aid of the frictional resistance of the pivot pin of the valve in its bearings and inclined surfaces) a guide lifting as well as a turning movement of the valve. After long use it may, however, happen that the valve, on account of the wear on its pivot pin, exerts so little resistance to the action of the lever that the valve only turns, while the lifting movement fails, with the result that the apparatus does not work. With the improvement, however, now claimed, the apparatus, although the inclined guide surfaces are dispensed with, cannot possibly fail to operate, and the valve is always sure to lift, seeing that the lever operating the valve is guided during its movements or oscillations so as reliably to impart a lifting movement to the valve.



A "Lux" Company's Gas Lighter and Extinguisher.

The illustration shows a vertical section of the valve mechanism needed for lighting and extinguishing gas lights from a distance; also side views of the mechanism in different positions.

The lever A is provided with a peg B pointing backwards and bearing on the stationary surface of the valve casing. This surface acts as a guide for the end of the peg, and when the lever C moves about its pivot, the peg, on account of the excess of the lever A, moves along the guide surfaces. Placed in some of the grooves of the valve are pins D, which serve to raise the valve one pin every second or third groove. When the lever C moves to the left, the front end of the lever A engages either one of the grooves or underneath one of the pins D, in order to press, in the latter case, upwards on the pin so that the valve is sure to be lifted and at the same time rotated.

When the pressure in the gas-conduit is increased, the diaphragm E bellies upwards, thus lifting the lever F and the weight G and turning the shaft H and the upper part of angle lever C to the right. During this movement, the lever A, being resilient in horizontal direction, slides on the circumference of the thicker middle part of the valve I. When the pressure in the gas-conduit afterwards decreases, the diaphragm returns to its original position whereby the part of the angle lever C by means of the weight turns to the left. During this movement, the end of the peg B slides on the surface; while the end of the lever A either engages one of the grooves or catches underneath one of the pins D. In the former case, the valve I will be rotated without being lifted.

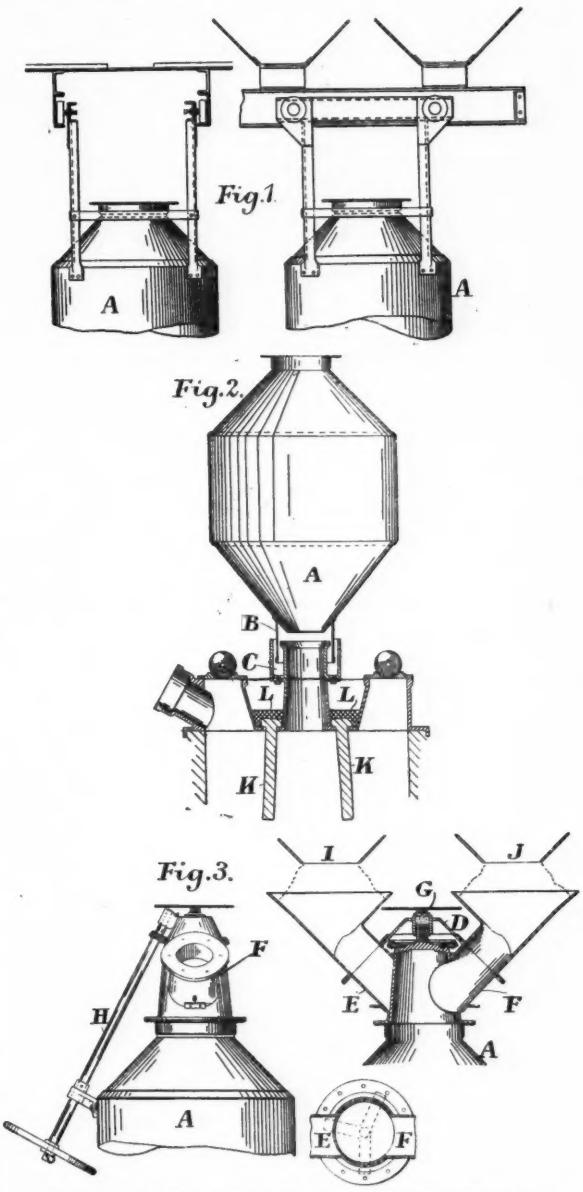
When, on the other hand, the lever A engages beneath a pin D, the following operations will occur: The arm of the angle lever C to which the lever A is fixed takes up a somewhat oblique position when at rest, so that its top end is somewhat raised when the angle lever is turned to the left to resume its normal position. The guide surface acting to maintain the peg B at a constant height, the front of the lever A is somewhat raised when the point of connection between the angle lever C and the lever A is lifted as it resumes its normal position.

Means for Charging Vertical Retorts.

ROBERT DEMPSTER AND SONS, LIMITED, and TOOGOOD, H. J., of Elland.

No. 3795; Feb. 15, 1912.

This invention relates to apparatus for charging vertical retorts of the continuous or semi-continuous type, and in particular to apparatus of the type which usually comprises a bin (above the retort) containing a supply of coal, which is fed into the bin through a gas-tight coal-valve and passes freely from the bin to the retort as the coke is removed from the lower end of the retort.



Dempster and Sons and Toogood's Vertical Retort Charger.

Fig. 1 shows elevations (at right angles to one another) of means for suspending the bin from the coal-bunkers, and fig. 3 is a section showing the relation of the lower part of the bin to the retort. The bin A is suspended by a carriage having wheels running on rails. Its outlet is surrounded by an annular extension B dipping into a water seal contained in a tank C having annular walls—the top of the inner wall being slightly lower than that of the outer one. The water-tank is provided with loops or eyes to engage hooks on the bin A, so that the tank can be lifted to clear the ascension pipes and taken away along with the bin when the retorts require to be scurfed.

Owing to the heat and the presence of coal dust and hot crude gas or smoke, the patentees point out that it is difficult to make valves for feeding the bin or shoot which will remain gas-tight and yet can be worked freely by hand power alone. The principal feature of their invention therefore is the arrangement of a valve which will answer these requirements—a plug valve, preferably tapered in order to allow of its exact adjustment to its seating after being set to work above the heated retort. The valve is arranged vertically, and can be completely rotated in either direction. It is thus self-cleaning, as the dirt gradually works downward by gravity.

Fig. 2 is an elevation and a central vertical section of the valve. D is the valve casing provided with inclined inlet shoots E F. On the hollow plug is a screw-threaded spindle G passing through lock nuts, by rotating which with a spanner the plug can be adjusted vertically

and locked at the required height. Secured to the plug is a bevel wheel engaging a pinion on the shaft H, by rotating which the plug can be turned so as to admit coal through either of the inlet shoots to the interior of the bin, or to present the blank portion of the plug to both inlets, and thereby cut off the supply. When charging the bin, the coal passes from the open outlets I J of the coal-bunkers to the wide open mouth of the shoot E F; these mouths being of such size that, when the valve is closed and the descent of the coal ceases, it seals the bunker outlets by resting above the shoots at its natural angle of repose. In case of necessity, however, the mouths of the shoots can be covered with metal plates made gas-tight by cement.

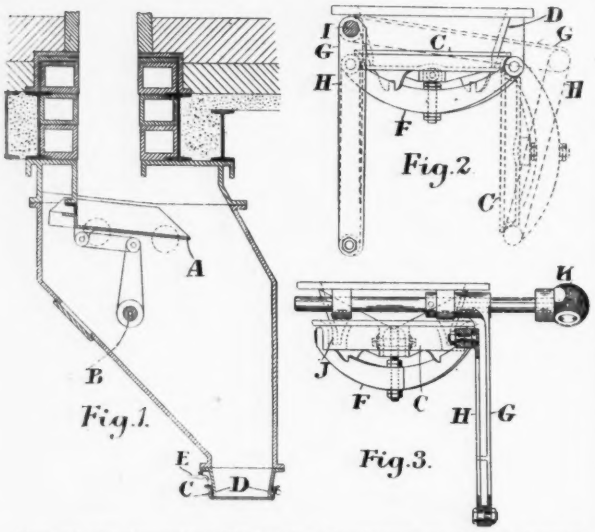
In order to maintain the general level of the coal in the retort at a height slightly below the highest point where heat is applied to the retort, so that liquids on the surface shall be quickly gasified, and the porosity of the charge maintained, there may be employed on each side of the charging inlet curtain bricks K (fig. 2) having T heads, which bricks can be passed through openings at each side of the coal inlet of the retort mouthpiece and the head sealed with fire-clay at L. The charge is thereby prevented from coming in contact with the sides of the retort above the level of the bricks, or somewhat below them according to the angle of repose of the charge.

Sealing the Discharging Mouthpieces of Vertical Gas-Retorts.

TOOGOOD, H. J., and ROBERT DEMPSTER AND SONS, LIMITED, of Elland.

No. 8647; April 12, 1912.

Alluding to their invention, the patentees say: The gas-tight qualities of self-sealing retort-lids depend upon the maintenance of the truth of surfaces which are in contact. In ordinary horizontal retort practice, the tar-laden crude gases deposit a film of tar upon such self-sealing surfaces, and, providing that the film be not allowed to accumulate to uneven depths or thicknesses, such tar deposits are beneficial in preserving the machined surfaces from corrosive action, and in compensating for any slight inaccuracies in the sealing faces. When considered, however, in relation to vertical retorts, or retorts having a vertical discharging mouthpiece, these beneficial factors no longer exist. For example, there will be no tar vapours to prevent corrosion, and no film of tar to mask slight inequalities in the truth of surfaces To add to these difficulties, the relatively hot coke standing directly on the lid forms, with the water or steam used for quenching within the mouthpiece, fumes having a great corrosive action; and, moreover, there being more heat, the ironwork has a greater tendency to warp out of shape, than in horizontal retorts. As a consequence of these difficulties, resort has been had to water-luted lids and fusible metal lutings. The former, however, are creative of excess steam, which, passing through the retort, impoverishes the lighting or candle power of the coal gas.



Toogood and Dempster's Discharging Mouthpiece for Vertical Retorts.

The present invention consists in combining the self-sealing and water-luted characters by providing a self-sealing lid capable of holding liquid, below the level of which the sealing faces meet, whereby such sealing faces are kept cool. The lid might, for example, comprise an annular trough into which the mouthpiece or fixed member enters; but as such a trough would, they say, be liable to receive coke, they prefer a saucer or basin-shaped lid, wherein the main supply of liquid would be between the fixed and movable members. Thus the liquid, in addition to preventing the entry of air or the escape of gas at this point, would protect the sealing faces from the corrosive fumes, while the sealing faces would prevent or limit the escape of the liquid to the interior of the mouthpiece, and consequent excess of steam caused by evaporation therein.

Fig. 1 is a sectional elevation of a mouthpiece constructed according to patents Nos. 11,209 and 11,210 of 1912, illustrating one mode of carrying out the present invention. Fig. 2 is an elevation of a self-sealing lid, similar to fig. 1, having toggle levers for actuating it according to patent No. 20,850, of 1908; the dotted lines indicating the position of the lid when opened by the toggle levers. Fig. 3 is an elevation of a self-sealing lid illustrating yet another mode of carrying out the invention.

In fig. 1, A is the discharging tray actuated from the shaft B, and C is a self-sealing pivoted lid provided with the usual sealing mechanism for pressing it against the mouthpiece. The lid is of such proportions as to form with the lip or spigot D of the mouthpiece an external trough or channel all round the spigot; and a tap E supplies water or other liquid to the channel.

In fig. 2, F is the crossbar of the lid, and G H are links actuated from the shaft I to open and close the lid.

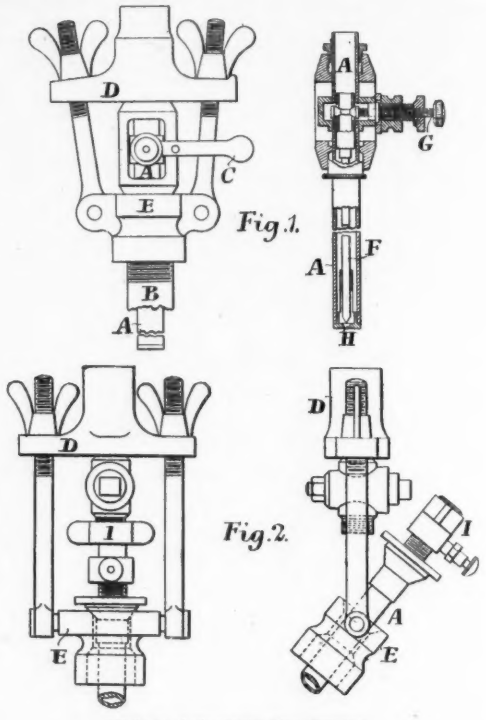
In fig. 3, the lip J of the mouthpiece dips into an annular trough or channel formed between the walls around the lid, which channel is supplied with water as described with reference to fig. 1. K is a ball for the reception of a hand lever whereby the shaft is actuated.

Burners for Gas Lamps, Fires, &c.

HELPS, G., of Atherstone.

No. 9775; April 25, 1912. No. 20,841; Sept. 12, 1912.

This combined invention relates to improvements in gas-burners such as are described in patent No. 16,835 of 1911—more especially to a modification according to which the nipple-tube can be so adjusted that it regulates the air entering the burner-tube, and can be removed for the purposes of cleaning or adjustment without the necessity of taking down the lamp.



Helps's Adjustable Gas-Burner.

Fig. 1 is an elevation and section of part of an adjustable nipple-tube and an adjustable needle. Fig. 2 is a front and side elevation of a modification.

The nipple-tube A passes through stuffing-boxes so that it can be moved up and down to close more or less the throat of the burner-tube B. The nipple-tube is connected to a movable block, which can be moved up or down by the lever C working on a block detachably secured between the flanges D E, on the supply pipe and burner-tube respectively, by means of hangers and wing nuts, as in the 1911 patent. The nipple-tube also contains a needle F, which can be moved up or down by screwing in or out the rod G, having at its end two cones which engage in a slot in the nipple-tube; thus altering the size of the gas orifice H.

In fig. 2, the nipple-tube A has screwing upon its upper end a cone-shaped collar by which the height of the nipple-tube can be adjusted; the upper end of the nipple-tube being connected to the supply pipe D by the union I.

Coin-Freed Gas-Meters.

ROBINSON, S., of Liverpool.

No. 10,571; May 3, 1912.

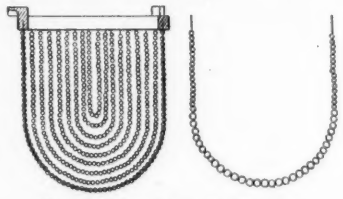
This coin-meter is so arranged that the cash-box can be slid out at the front or the side, whichever is found to be most convenient; thus enabling meters all of one pattern (instead of two patterns or designs) to be made. This is effected by providing a door or doors so made as to cover two walls of the coin-box—the front wall and a side wall. The door is hinged to the meter by a hinge having a vertical or horizontal pin, or the door may even be made to slide. When closed, it is secured (say) by a hasp and padlock, or by a screw or seal, and so assures the safe custody of the coin receptacle. Any authorized person, however, can get at the coin-box by unlocking and opening the door, which then exposes two sides of the box, so as to enable it to be drawn out at the front or at one side.

Incandescent Gas-Mantles.

HERSEY, M., of Highbury, N.

No. 10,461; May 2, 1912.

These incandescent mantles are formed of beads or particles of incandescent material threaded upon wires and arranged round the flame of the burner. In order to apply them to inverted burners, the mantle-ring is made as usual with suspending lugs, and attached to it



Hersey's Incandescent Mantles.

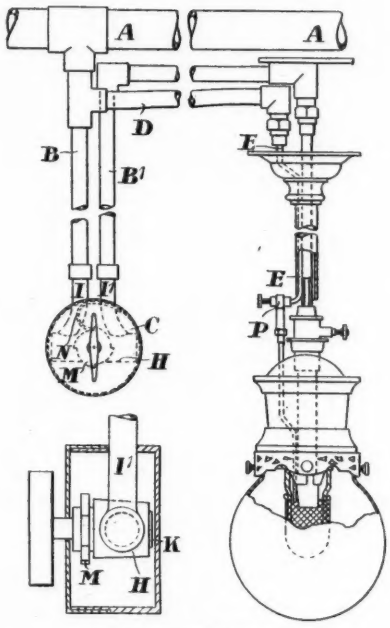
are the two ends of each wire loop on which the beads or particles are threaded—being graduated in size and arranged with the largest one in the centre, and the smallest at the ends, so that a hollow or cup-shaped mantle is formed, as shown.

Gas-Lighting Systems.

LIEBE, E., of Berlin.

No. 13,224; June 5, 1912. Convention date, July 18, 1911.

This is an invention whereby distant lighting is effected by means of a gas-switch connected as shown in the illustration.



Liebe's Automatic Gaslighter.

The gas supply passes from the pipe A into the pipe B through the gas-switch C and pipe B¹. From the pipe A or B leads a pipe D, to which is connected a small pipe E for supplying gas to the pilot flame of (in this case) an inverted gas-lamp.

The gas-switch comprises within its casing a tap H, which communicates with two branches II¹ connected to the conduits BB¹. The plug K, formed with a projecting neck and external handle, is controlled so as to keep it gas-tight, and can be removed after taking off the cover of the casing. The neck of the plug carries within the casing a ratchet wheel M normally retained by a spring N in the various positions for the full supply of gas to the burner or the interruption of such supply. The gas-tube E (for the ignition flame) is lodged with the burner-tube in a loose covering tube fast in the ceiling rose, and (bent outwards at right angles) is connected with a fitting P (containing an ordinary regulating valve), which is united with another tube which passes through the head of the lamp and then leads to the burner. The burner is made of magnesia in tubular form arranged in vertical position close by the gas-burner tube. The ignition burner serves, when correctly adjusted during ignition, to heat up the burner-tube, so that, "when switching on the gas for the latter, the full flame obtains at once, and this without any explosion of gas." Moreover, the magnesia tube of the ignition becomes heated to a white heat by the incandescent burner, so that the tube cannot become coated with carbon, but "will at all times safely re-light the pilot flame when the main burner is being extinguished."

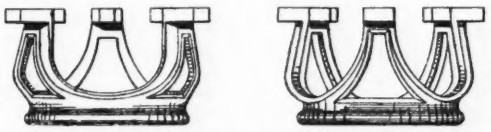
After cooling down, the patentee points out, the ignition flame appears as a small blue flame which keeps the magnesia tube slightly glowing, and this, in turn, keeps the inner lamp body at a certain heat. "This is an important advantage for the incandescent body as well as for the glass fittings of the lamp, because ordinarily the humidity and variations of temperature of the atmosphere produce objectionable effects on these parts. Thus, protection is afforded against the usual breakages through changes in the weather or sudden cooling."

Inverted Incandescence Gas-Burner Mantle Rings.

BRIDGER, J., of Farringdon Avenue, E.C.

No. 13,674; June 11, 1912.

This invention has for its object so to construct mantle rings as "to readily permit of the rapid escape of the hot products of combustion, and to prevent, as far as possible, these products being deflected from the surface of the ring on to the glass cylinder surrounding the mantle, as this causes great inconvenience and expense owing to the frequent melting or softening of the upper part of the cylinder and its lugs, and the tilting or dropping down of the cylinder."



Bridger's Inverted Incandescent Gas-Burner Mantle Ring.

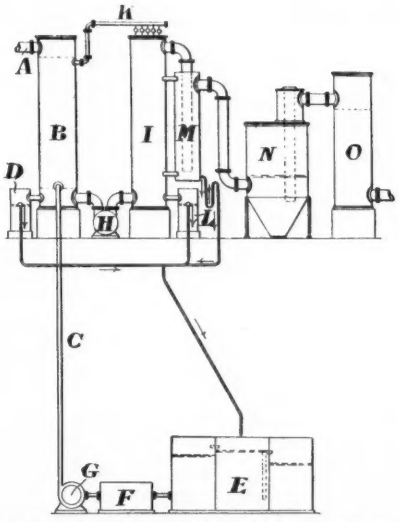
The supporting arms carrying the usual lugs are each formed with an opening (or openings) of as large an area as is possible, but such as will not appreciably weaken or diminish the strength of the ring. The openings may, with advantage, have their outer edges chamfered. The connecting portions between the perforated supporting arms are (as shown) deeply curved or hollowed out to such an extent as to leave only sufficient material at the base of the ring to receive the usual groove for attaching the mantle thereto. These curved or hollowed-out portions may, likewise, have their external edges chamfered. The purpose of the chamferings, both here and of the openings in the supporting arms, is for further preventing the heat from being deflected on to the glass cylinder. In a mantle ring constructed as described, the hot products of combustion will at all times find a ready exit; and consequent on deeply hollowing out or curving of the portions between the arms, considerably less material will be present than heretofore to deflect the heat. "Thus, melting or softening of the upper part of the glass cylinder, as now frequently occurs in inverted incandescence gas-lamps of the intensified type, is minimized or diminished, to a considerable extent." A further and important advantage to be derived from this construction of ring, is that in case of breakage of one of the halves of the arms the other half will still operate to retain the ring and its mantle in position.

Recovering Tar and Ammonia from Coal Carbonization.

C. OTTO AND CO., G.M.B.H., of Dahlhausen a. d. Ruhr, Germany.

No. 15,584; July 3, 1912. Convention date, July 10, 1911.

The process according to this invention consists "in using liquor separated from the tar to condense further quantities of tar and liquor from the volatile products, and then bringing the liquor thus used and thereby heated into direct contact, on the counter-current principle, with the gases thus cooled, whereby the latter take up free ammonia and evaporate a considerable quantity of the water before passing into the saturator in which the ammonia is absorbed as ammonium sulphate."



Otto Company's Tar and Ammonia Recovery Process.

The hot crude gases enter at A the condenser B, which is cooled by liquor raised by a pump G through the pipe C—being drawn by the pump through a cooler F from the tar separating tank E. The tar and liquor condensed in B flow through the tar-pot D into the tank E. A blower H forces the gases which leave the condenser up the washer I. On the other hand, the liquor heated in the condenser is forced by the pump to flow through the pipe K and suitable spraying devices

into the top of the washer. In the washer the gases absorb the free ammonia and a large quantity of water vapour from the heated liquor, the rest of which flows back through the seal-pot L into the tank E to be circulated again.

After passing through the washer I, the gases traverse a spray catcher M, and then enter the saturator N. Another condenser O is inserted after the saturator to condense aqueous vapour; "the condensed water being applicable for various purposes, such as coke quenching."

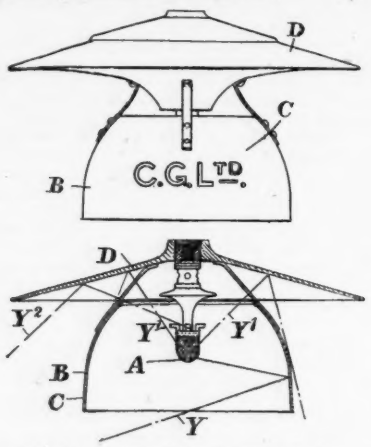
The liquor in the tank E, it is said, becomes more concentrated than liquor hitherto produced, and requires comparatively little heat for its distillation with lime, or "it may even be profitably worked-up for ammonium chloride."

Reflectors for Lamps.

GRIGSBY, B. J., of Rosebery Avenue, E.C., and CAMPBELL, G., of Victoria Street, S.W.

No. 14,643; June 22, 1912.

The objects of this invention are: Firstly, to provide such a construction of reflector as shall distribute the light in the desired direction (avoiding glare to the eye); and, secondly, in such a combination of two reflectors—an upper and a lower one, the lower one opaque—that the upper reflector shall reflect light upon the exterior surface of the lower reflector to illuminate it.



Grigsby and Campbell's Lamp Reflector.

The illustration shows one form of the invention as adapted for advertising or sign purposes; also a section of the lamp having a concave upper reflecting surface fitted with an inverted incandescent gas-burner.

The line Y indicates the direction of the reflected light issuing from the lower reflector B; the line Y^1 indicates the angle of incidence and reflection of a portion of the light falling upon the upper reflector D, and serving to illuminate the exterior surface of the lower reflector C; while the line Y^2 indicates the course taken by light directly reflected and distributed. This example of combined reflectors has lettering cut through the opaque reflector B; therefore showing the cut-out letters more brilliantly than the exterior of the reflector, and enabling the letters to be visible in daylight, when the lamp is not lit.

APPLICATIONS FOR LETTERS PATENT.

4006.—SOUTHEY, A. W., "Production of gaseous fuel." Feb. 17.
4046.—TWIGG, W. R., and VASEY, S. A., "Detecting the presence of products of combustion of gas." Feb. 17.
4083.—WALKER, A. B., "Gas-stoves." Feb. 17.
4100.—REYNOLDS, W. W., "Lighting coal-fires by gas." Feb. 18.
4104.—DRAKES LIMITED, and DRAKE, W. A., "Retorts." Feb. 18.
4105.—DRAKES LIMITED, and DOBSON, A., "Discharging retorts." Feb. 18.
4159.—ROBINSON, H. W., "Treatment of tar." Feb. 18.
4189.—ALLEN, T. J., "Petrol gas." Feb. 18.
4209.—VERITY, C. H., "Fittings and mantles." Feb. 19.
4210.—DAVISON, J., "Mechanical gas-poker." Feb. 19.
4294.—WADE, H., "Gas-generators." A communication from Ehrhardt and Sehmer G.m.b.H. Feb. 19.
4338.—DEMPSTER, R. & J., LTD., BEARD, G. F. H., and SCOTT, J. W., "Ladders for spirally-guided gasholders." Feb. 20.
4385.—SIDAY, W. E., "Boiler attachment to gas-stove." Feb. 20.
4486.—TIMM, F. C. W., "Distillation of fuels." Feb. 21.
4509.—PRYOR, E. L., "Gas-ovens." Feb. 21.
4519.—ANDERSON, D., "Gas-regulators." Feb. 21.
4530.—LIVESEY, R. M., "Production and storage of potential energy." Feb. 22.
4572.—LEWIS, G. L., "Gasifying solid carbonaceous matter." Feb. 22.
4574.—HIBBERD, C. E., and GOAD, F. L., "Coin-freed mechanism." Feb. 22.

Anniversary of Gas Lighting in Cork.—The "Cork Examiner" last Thursday noted that the previous day was the ninety-seventh anniversary of the first installation of gas in the city; Mr. John O'Brien, a manufacturer, introducing it in his factory and workshop on Feb. 26, 1816, to, as a writer of the period recalls, the "general admiration" of the citizens, who crowded the streets and approaches to inspect the then new form of illuminant.

MISCELLANEOUS NEWS.

BERLIN CORPORATION GAS UNDERTAKING.

Report for the Year 1911.

In the number of the "Journal für Gasbeleuchtung" for Feb. 8 appeared extracts from the report of the Administrative Committee of the Berlin Municipal Gas-Works on the working results of 1911. We give some particulars therefrom.

Mention is first of all made of the new agreement with the Imperial Continental Gas Association—supplementary to that of 1901. Possible new areas in dispute have been arranged for, which were not covered by the former agreement, and where competition was proving injurious. Other parts of Berlin have also been arranged for, which may at some future date be built on, and demand a gas supply. Arrangements were also made for granting a discount of more than 5 per cent. to some of the larger consumers of gas for heating, power, industrial purposes, &c., so as to keep them from erecting private plant of their own. New arrangements, favourable to the consumers, were also made for the hire of gas-irons, and for the maintenance of lighting installations.

The following are some of the figures given: The total number of consumers at the end of the business year was 378,160—283,035 of whom use ordinary, and 95,125 prepayment, meters. During the year 31,508 (against 17,206 the previous year) prepayment consumers were added; and 11,199 ordinary (against 14,435 the previous year). But the gas sold showed an increase of only 100,587,000 cubic feet, or less than a quarter of the increase of the year before. The total consumption was about 10,578,000,000 cubic feet, an increase of 1·4 per cent. on the previous year. Prepayment meters alone accounted for 990,500,000 cubic feet of the total. The coal strike in England necessitated the purchase of the more expensive Silesian coal, with its high railway freights. The scarcity of coal was to some extent met by the use of larger quantities of water gas, and a smaller output of coke naturally resulted. This fact, together with the severe winter, had led to a complete clearance of coke stocks. The Committee still thought it undesirable to join the "Wirtschaftliche Vereinigung deutscher Gaswerke"—preferring to regulate their own coke prices and study the interests of the people as well as their own.

Coal to the amount of 772,390 tons was used to make 8,750,531,000 cubic feet of coal gas—a make of 11,330 cubic feet per ton. With 35,525 tons of coke and 17,346 tons of oil were produced 1,831,495,000 cubic feet of water gas. The total production corresponds to an output of about 5083 cubic feet per head of the population, or, including the gas made by the Imperial Continental Gas Association within the city, 5930 cubic feet per head. In the course of the year several communes were added to the district supplied from the municipal works, making the total up to 32 suburbs, with a population of 194,830.

REGULATION OF AUSTRALIAN GAS COMPANIES.

The Bill as Passed.

In previous issues of the "JOURNAL," indications have been given of the scope of the Bill introduced into the New South Wales Parliament to regulate the supply of gas; and in the number for the 14th of January (p. 121), the alterations made in the measure in passing through the Legislature were explained. We have now received from Mr. R. J. Lukey, the Secretary of the Australian Gaslight Company, a copy of the Act (No. 71 of 1912); and the following epitome of its provisions will supplement what has already appeared.

The object of the Act is to "prescribe standards of illuminating power, purity, and pressure for gas; regulate the price of gas; regulate companies, corporations, firms, and persons supplying gas, and particularly with regard to dividends, reserves, funds, accounts, and the issue of shares; and for purposes consequent thereon or incidental thereto." It is to be cited as the "Gas Act, 1912;" and, except as to sections 15, 20, and 29, is to come into force on July 1, 1913. Sections 15 and 29 came into force on the passing of the Act (Dec. 20, 1912); and section 20 on Jan. 1, 1913. Section 3 specifies that the Act applies to all companies who were supplying gas at the commencement of the Act, or who may thereafter do so; but certain sections apply only to the Australian Gaslight Company, the North Shore Gas Company, and the Newcastle Gas and Coke Company.

Sections 4 to 10 deal with the testing of gas. The illuminating power is to be 15 candles with a 5 feet rate of gas consumption; and the calorific value, 500 B.Th.U. [? gross or net.] Two candles are to be used together in an open 66-inch Letheby or an enclosed 100-inch Evans photometer; and the burner is to be the "Metropolitan" No. 2. Other companies than the above-named three may use a Lowe jet photometer. The testing apparatus is to be provided by the Companies at places on their own lands approved by the Minister; and these are not, except by agreement, to be more than three in number. The penalty for defective illuminating power is not to exceed 40s. for the first half candle; and not less than £25 and not more than £100 for the first and every subsequent candle. Where one penalty is imposed in respect of a testing-place on any day, no further penalty is to be imposed in respect of defective illuminating power at any other testing-place on the same day; and the average of three days is to be taken. The penalty for sulphuretted hydrogen is not to exceed £50, and be limited to one place and a three-days' average. The pressure is to be 6-10ths from midnight to sunset, and 1 inch from sunset to midnight, "unless a gas company shall be prevented by accident, or by the necessity of temporarily opening or otherwise temporarily disturbing its mains in the locality for the purpose of effecting repairs to, or making connections with, such mains;" the penalty for default not to exceed £20, and is to apply to a period of 24 hours.

Section 11 exempts a company from penalties when the circumstances

attending the default are beyond their control; and sections 12 to 14 deal with the appointment of examiners by the Governor.

Sections 15 to 20 apply only to the three Companies already named. They are to work under a sliding-scale; the standard dividends being 10 per cent. on the original capital, 7 per cent. on additional capital, and 5 per cent. on the preference capital. The Companies are authorized to capitalize their reserves and premium capital, and to form a special purposes fund by contributions to the extent of 2 per cent. per annum on the paid-up capital including premiums—the total to be limited to one-tenth of the entire capital. The standard price of gas is to be 3s. 6d. per 1000 cubic feet for the three Companies, with increases or reductions of 5s. or 2s. 6d. for every 1d. decrease or increase in prices extending over a year or a half year. Clause 20 contains the following provision:

If at any time after the first day of January one thousand nine hundred and thirteen the cost of production of gas is increased above the total cost of production at that date by reason of any alteration in labour conditions, including wages, by any award made under the Industrial Arbitration Act, 1912, or any Act amending the same, the gas company whose cost of production is so increased shall be entitled to have the standard price of its gas increased by proclamation in manner hereinafter provided by one penny per thousand cubic feet for every penny by which the cost of producing one thousand cubic feet of gas is increased as aforesaid.

The process to be followed to ensure the issue of this proclamation is fully set out.

Sections 21 to 23 deal with the issue of additional shares and the accounts and the audit of them.

Sections 24 to 29 are general and supplemental. They provide for the amendment of the schedules, the making of regulations by the Governor for carrying out the provisions of the Act, and the recovery of penalties. The cost of supply pipes is to be divided between the company and the consumer; and 45 days' notice is to be given by an owner or occupier of premises requiring a supply of gas. The charge for the hire of a prepayment meter is not to exceed 10d. per 1000 cubic feet beyond the ordinary price of gas. Section 29 gives power to all gas companies to raise additional capital, borrow money, and consolidate and divide their share capital.

In a schedule to the Act is given a form of annual accounts on the lines of that contained in the Gas-Works Clauses Act, 1871, but accompanied by a special balance-sheet furnishing details of the capital and liabilities and the property and assets of the company. Particulars have to be supplied of the amount of debts owing by the company; specifying those for which acceptances have been given, and those due to tradesmen, for law expenses, &c. Among the debts owing to the company, any money due from a director or other officer is to be separately stated. The property held by the company is to be entered as immovable and movable; and the nature of the investments and the rates of interest upon them are to be set forth.

EDINBURGH AND LEITH GAS COMMISSION.

Contribution to the British Commercial Gas Association—Rebates and Discounts to Consumers.

At a Meeting of the Edinburgh and Leith Corporations' Gas Commissioners on Monday last week, the Works Committee submitted a recommendation that a contribution of £100 should be made to the British Commercial Gas Association for one year, on the distinct understanding that they should have no further liability. Mr. Pennell moved disapproval of the recommendation. He declared that, however meritorious it might seem to make payments to a London Association in connection with the giving of increased publicity to the advantages of gas, it was, in his opinion, quite illegal on the part of the Commission to do so. Mr. Lyon moved approval of the recommendation. He pointed out that the grant was not to a society for its own good, but was practically a sum they were putting into a general advertising fund, which would probably bring an enormous profit. Lord Provost Inches, who presided, emphasized the point that although the Commissioners were paying to a London Association, the advertising was not confined to London, but extended all over the country. If they believed the information laid before them, it had done a great deal of good elsewhere, and was likely to do it in Edinburgh. The recommendation was adopted with three dissentients.

A proposed revision of wages of the foremen at the Granton works, involving an increase of £94 18s. per annum, was objected to by Mr. Pennell, who said there were questions involved which, in the public interest, demanded further consideration at the hands of the Commission. He urged that there was an extraordinary disparity between the sum expended on the wages of the foremen at Granton and those employed at other works. What he thought they ought to have before them was a statement of the wages paid at (say) the largest gas-works in Glasgow. Then they would probably be quite satisfied that the sooner they put some of the officials at Granton on the retired list, the better it would be for the Commission. The recommendation was approved by twelve votes to seven.

The Commission decided to amend their terms and conditions of gas supply so as to give large consumers rebates and discounts to the maximum of 21¼ per cent. The amendments made are as follows: That to consumers of gas with an annual consumption of 6 to under 9 million cubic feet, the rebate should be 10 per cent.; 9 to under 12 millions, 11 per cent.; 12 to under 15 millions, 12 per cent.; 15 to under 18 millions, 13 per cent.; and 18 to under 21 millions, 14 per cent. For payment within a fortnight of rendering accounts, it was decided that a discount on the actual consumption should be allowed as follows: On from £1200 to less than £1600 per annum, 1½ per cent.; £1600 to less than £2000 per annum, 3 per cent.; £2000 to less than £2400 per annum, 5¾ per cent.; and £2400 to less than £3000 per annum, 7¼ per cent.

Shares of £10 each in the Gosport Gas Company realized by public auction last week prices ranging from £12 7s. 6d. to £12 12s. 6d. per share.

ILKESTON GAS UNDERTAKING AND THE RECENT DISCLOSURES.

[From Our Local Correspondent.]

A great deal of irritation continues to be publicly manifested at Ilkeston regarding matters which arose during the recent Local Government Board Inquiry, when the admission was forthcoming that plans, upon the faith of which authority was sought to borrow a large sum for gas-works extensions, were deviated from in essential particulars, and the money was spent upon a different type of work from that for which sanction was given. The feeling unmistakably appears to be that the members of the Gas Committee who held office at the period when the change was covertly made should alone take responsibility for a process which was described by the Inspectors as that of hoodwinking the Board. The attempt to saddle the liability upon Mr. F. C. Humphrys, the Manager (who has spent 35 years of his professional life in the service of the town), has been unsparingly condemned; it being pointed out that the iniquity thereby involved is particularly glaring, in view of the fact that his responsibility was limited to carrying out directions for which accredited members of the Corporation were alone liable. Moreover, the course which has been permitted, of allowing Mr. Humphrys vicariously to bear the blame, is characterized as being especially ungenerous, when it is remembered that he has been the head of the only municipal trading undertaking in the borough which has been worked at anything like a profit to the ratepayers. Indicative of the strong feeling which had been aroused, there were announcements forthcoming last week of the intention to convene a ratepayers' indignation meeting; but out of respect alone to the feelings of the late Manager, the idea was abandoned. Meanwhile, there is some little curiosity being manifested as to the exact position which the erstwhile occupant of the office will hold under the new *régime*. It is not known exactly whether it will be that of Assistant Gas Manager or Consulting Engineer. A definite statement upon the point will, it is understood, be forthcoming at the meeting of the Council this week, when possibly the interest in the situation may be accentuated by the receipt of a communication from the Local Government Board—it being evident from what fell from the Inspectors during the recent investigation that the central authority may have something serious to say in relation to incidents connected with the application for the previous loan.

ENFIELD GAS COMPANY.

The Proposed Amalgamation with the Tottenham Gas Company.

The Ordinary Half-Yearly General Meeting of the Enfield Gas Company was held at the offices last Thursday—Colonel Sir Alfred Somerset, K.C.B. (the Chairman), presiding.

The General Manager and Secretary (Mr. C. W. Offord) read first the notice of meeting, and afterwards the Chairman's statement, owing to Sir Alfred suffering from a severe cold.

The Chairman, in the course of his statement, said that, except in one or two particulars, the accounts did not call for special comment. It was therefore only necessary for him to point to the very satisfactory increase in the sales of gas, and to the fact that, in spite of the increased cost per ton of the coal used, and a general rise in the prices of other materials—consequent more or less, but not, he thought, entirely, upon the greater cost of the coal and labour used in their manufacture—a profit had been realized large enough to pay the dividend and the bonus recommended in the report. The outstanding feature of the half year was the negotiations opened with the Company by the Tottenham and Edmonton Gas Company for amalgamation. The Directors were first approached on the 4th of November only; and he believed he was right in saying that not a single Director had the slightest knowledge before this date that the matter was in the minds of the Directors of the Tottenham Company. The general proposition was brought to the shareholders' notice by circular as quickly as possible, and then details were discussed by representatives of the two Boards. In due time, terms were agreed upon, embodied in a provisional agreement, and afterwards in the Bill which would subsequently be explained and submitted for formal approval. Having obtained what, after close consideration, the Directors regarded as favourable terms, they tendered the shareholders the opinion expressed in the report—viz., that it would be advisable to accept them. He therefore moved that the report and accounts for the half year ended Dec. 31 be received and adopted.

Mr. A. L. Ford, in seconding the motion, explained some details of the accounts. He said the outlay on capital account was £3299, which included, under the heading of "new buildings," expenditure for new washers and washer-scrubbers and the buildings to contain them, £516 for additional meters, and £522 for additional cookers. The increased outlay on coals, £1338 (made up of £736, the cost of 772 more tons carbonized, and £602 due to the increased price per ton) for the half year, had been 1s. 0½d. per ton. Under the new contract, starting from last July, the increased price amounted to 2s. per ton. Having dealt with other items of expenditure, Mr. Ford remarked that rates and taxes showed for, he believed, the first time in their existence a decrease of £118. This was because of the concessions made by the Board of Inland Revenue, after conference with the representatives of the gas industry, in regard to allowances for depreciation. Coming to the revenue, the shareholders would be glad to see an increase of £1235 in rentals for gas. The price of gas had not varied, and the extra quantities sold showed how the demand was increasing. The total quantity sold was 131 million cubic feet—an increase of 10,700,000, or at the rate of 8·88 per cent. There was an increase in consumers of 381—a rather smaller number than in the last few years; of 27 in the number of public lamps, which was not so large as usual; but there was an increase of 547 in the stoves—the largest they had had since they started them in 1886. In prepayment meters there was an increase of 364. The quantity of gas consumed

per slot meter was 7217 cubic feet, which was the highest since they were started in 1894. The average slot consumer now used nearly 14,000 cubic feet of gas in a year.

The motion was carried, as was also one declaring a dividend of 5 per cent. per annum on the consolidated preference stock and of 5½ per cent. per annum on the consolidated ordinary stock, and authorizing a supplemental distribution on the last-mentioned stock at the rate of 1½ per cent. per annum, contingent upon the amalgamation with the Tottenham Company being effected.

Colonel Sir Alfred Somerset was re-elected Chairman for the ensuing year; and it was mentioned that he had filled this position for sixty years. Mr. H. A. Cole, F.C.A., was re-appointed an Auditor.

The Directors were accorded a formal recognition of their conduct of the business of the Company; and a vote of thanks was unanimously passed to the officers and staff.

Mr. OFFORD, in acknowledging the vote, said those who worked with him from day to day were indeed a very loyal body and deserved the praise accorded to them.

The business of the ordinary meeting then closed.

A Special Meeting was then held to consider the question of the proposed amalgamation of the Company with the Tottenham and Edmonton Gas Company.

The notice convening the meeting having been read,

Mr. HUGH FORD, the Solicitor to the Company, explained in detail the Bill promoted by the Tottenham Company.

Mr. J. W. FORD then moved the following resolution: "That the Bill submitted to this meeting, intituled 'A Bill to provide for the transfer of the undertaking of the Enfield Gas Company to the Tottenham and Edmonton Gaslight and Coke Company, and to confer on such Company certain powers in regard to the supply of electricity and for other purposes,' be, and the same is, hereby approved, subject to such additions, alterations, or variations as Parliament may think fit to make therein and the Directors shall sanction." In submitting the resolution, Mr. Ford referred particularly to the relative positions of the two Companies in the matter of capital unit per million cubic feet of gas sold and its effect upon the price of gas, and so upon the possibility of commanding the demand for gas hour by hour, instead of its occasional use for heating and motive power. He remarked that, though he had seen this unit reduced in the case of the Enfield Company from £2000 to £758, the amalgamated concerns would at once attain a figure of approximately £432.

Mr. A. L. FORD seconded the resolution.

Considerable interest in the matter was evinced by the shareholders in the numerous questions put on a great variety of points; and on the resolution being submitted, it received unanimous approval.

WORTHING GAS COMPANY.

The Goring New Works Site and Mr. Schweder's Opposition.

The Half-Yearly General Meeting of the Worthing Gas Company was held on Saturday, the 22nd ult.—Mr. H. H. GARDNER (the Chairman) presiding.

The SECRETARY (Mr. W. F. Verrall) having read the notice convening the meeting, the report and accounts were presented.

The CHAIRMAN, in moving their adoption, stated that £1212 had been spent on capital account, made up of £490 for new mains and services, £247 for new meters, and £475 for new stoves. They had taken the opportunity of depreciating the meters, stoves, and fittings by the sum of £1320; so that the total expenditure on capital account to date had been reduced by £108. Dealing with the revenue account, he said coals had cost £8928—an increase of £238 over the corresponding half of last year, occasioned by the greater output of gas. Purification charges and wages showed a reduction of £149 as a result of the installation of new purifiers; less labour having had to be employed. On the repairs and maintenance of works account there was a marked decrease of £1461, chiefly due to the absence of any charge for the renewal of purifiers. The distributing charges stood at £2594, in comparison with £2128 a year ago. Some months back, the Board adopted the policy of laying services free up to the meter; and this accounted for the additional expenditure. The aggregate expenditure was £17,188—a reduction of £800. Receipts from the sale of gas had been augmented by £418, and there was a total increase of £507 from this source and from rentals of meters and stoves. The residuals showed the following increases: Coke, £338; tar, £364; and sulphate of ammonia, £45. The total receipts amounted to £23,249, compared with £22,009 for the second half of last year. Excellent as the working results had been, the management had been more than usually handicapped by the long-felt want of more storage. The sudden variations of temperature had caused additional and sudden demands, and fluctuations to the extent of 25 or 30 per cent. within a few days had not been uncommon. These, in addition to causing the management considerable anxiety, were a most expensive matter. The Chairman concluded with an expression of thanks to the Manager (Mr. W. A. Walker) and the staff for their loyal and devoted services.

Alderman PATCHING seconded the motion; and it was carried.

A dividend at the rate of £5 5s. per cent. per annum was then declared on the consolidated ordinary stocks, and the business of the ordinary meeting closed.

An Extraordinary Meeting was then held for the purpose of considering the Bill now before Parliament, to confer further powers on the Company.

The CHAIRMAN moved that the Bill be approved. Having outlined the events that led up to the acquisition, at a cost of nearly £5000, of a site for new gas-works at Goring, he said that, having failed in his endeavour to convince the proprietors that it was to their interest practically to abandon the site obtained at so great a cost, Mr. P. E. Schweder (one of the shareholders) promptly endeavoured to make it useless by constructing a tunnel under the roadway between Worthing and Goring, ostensibly to connect his property, which lies on both sides of certain parts of the road, but admittedly in the hope that he would thus prevent the Company from laying their trunk mains to the site in question by the most direct and only practicable route. The Directors were advised by eminent Counsel that they had the legal right to lay their mains over Mr. Schweder's tunnel, and they accordingly expended a further large sum in laying mains up to and over it. But their efforts to bridge the tunnel proved unsuccessful. The Company's Engineers thereupon devised another plan to surmount the tunnel; and although, in a recent action brought by Mr. Schweder against the Company, the legality of this plan was upheld by the High Court, the proposal was rendered ineffectual owing to alterations and additions to the tunnel made by Mr. Schweder pending the hearing of the action. Consequently the Directors' efforts to utilize the Company's property had again been thwarted. The Directors had been advised, and believed, that there was every reason for anticipating that Parliament would give them the powers sought to be obtained by the present Bill, whereby the mains laid on both sides, and up to the tunnel, could be connected. Mr. Schweder was the only petitioner against the Bill. There had been negotiations with a view to ending the controversy; but he (the Chairman) regretted that they had been unfruitful.

The SECRETARY then read and explained the Bill, an epitome of which was given in the "JOURNAL" for the 21st of January (p. 163).

The CHAIRMAN moved that the Bill be approved.

Mr. J. CASH, in seconding the motion, dealt in some detail with the statements made in a circular sent out to shareholders by Mr. Schweder. He said Mr. Schweder had stated that he considered it would be contrary to the interests of the shareholders if the Directors were allowed to proceed. While he was a shareholder in the Company, his prime interests lay in the property he owned at Goring; and he was naturally anxious to avoid the Company placing the works in the neighbourhood of his property. Mr. Schweder claimed that he had endeavoured to arrive at an amicable and advantageous solution; but he (Mr. Cash) was afraid that the only solution that would really satisfy Mr. Schweder would be for them to abandon the Goring site. This was the *crux* of the whole matter; and it was a solution they could not contemplate. After five or six years, Mr. Schweder proposed an alternative scheme—viz., to put the works at Shoreham Harbour; and he said there would be a considerable saving in the price of coal, that there would be no necessity for a railway siding, that they would be relieved of the necessity of building cottages for workmen, and that Parliament would readily grant the power to exchange the Goring site for another. He (Mr. Cash) failed to understand the last statement, because it would mean that they would have to acquire a site elsewhere; and what was to become of the Goring site then he did not know. Mr. Schweder estimated a saving of £3000 for coal; but there were other considerations which were fatal to the suggestions made. They would have to bring the coke back into Worthing by road, and there was the question of wharf construction, and the increased cost of the main connecting the two places together; and they had no information on the question of foundations. There was also the important question of what they should do with the existing site, on which they had spent so much money, and the Goring main, which was laid practically its entire length. The most important consideration of all was the question of time. Even supposing that the Shoreham scheme had everything else to commend it, it would mean a new Bill in Parliament; and assuming that there was no serious opposition, the Royal Assent could not be obtained until August, 1914, and a gasholder could not be brought into operation until the winter of 1915 or the spring of 1916. This, he assured them, was a vital matter to the Company. It was too late to amend the present Bill, even if they wished to do so. They already had power to put gas-works on the Goring site. The present Bill went no further, except to complete these powers by giving them authority to go along Goring Lane. If Parliament refused the Bill, and allowed Mr. Schweder to dictate to them as to the way in which they were to carry on their business, it would be a very grave position, not only for the Company, but for the town of Worthing.

Major MARGESSON asked whether it was not possible to reconsider the Goring site in view of the alternative one at Shoreham Harbour, which had great advantages. There were other alternatives, such as amalgamation with neighbouring companies, or buying gas from them. Litigation was very expensive; and it might be cheaper even now for the Company to go to Shoreham Harbour or amalgamate. Mr. Schweder's fight was a fight for hearth and home.

Mr. P. E. SCHWEDER, who spoke at considerable length, reiterated and enlarged on the points contained in his circular. The Bill was, he said, one to take away his property, which the Company coveted and wanted to take. He complained that the Chairman had declined to discuss the question of the alternative site, and that he (the speaker) was refused permission to lay the scheme before the Company's Engineer. He was simply protecting his hearth and home. It was nothing but a worry and trouble to live at Goring; and if the gas-works came there, he would spend his money elsewhere. He was being persecuted, and he would fight to his last ditch. He recommended the Company to take gas from the Brighton Company for the time being. They could get gas in bulk to their boundary, and make a good profit. The only necessity for moving at all was that they needed a gasholder; and this could be arranged at a lower cost than putting one on 16 acres of land at Goring. If a scheme so disadvantageous to the consumer were proceeded with, he should lay his views before the consumers, who might have something to say in the matter.

Other shareholders having spoken in opposition to the Bill,

Mr. CASH replied to Mr. Schweder's remarks. With regard to the suggestion that the Company should buy gas from the Brighton Company, he said the Directors went into the matter, but were absolutely convinced that they could not recommend such an arrangement.

The resolution approving of the Bill was then put and carried—only four voting against it.

Mr. Schweder demanded a poll, which was taken forthwith.

The SECRETARY announced the result as follows: For the resolution, capital representing £71,072; against it, capital representing £8348.

The CHAIRMAN then declared the resolution duly carried; and the meeting closed with a vote of thanks to the Directors—only Mr. Schweder voting against it.

A RECORD PROFIT AT SUNDERLAND.

The Mayor of Sunderland, who, as Chairman of the Sunderland Gas Company, presided at the annual meeting last Wednesday, said the year under review had been more than usually interesting. The consumption of gas had shown the largest increase for many years, which reflected not merely the present boom in trade, but was also attributable to the greatly extended use of gas for cooking and heating purposes. Commenting on the accounts, the Chairman said that favourable contracts and careful management had resulted in a successful year's trading which showed a net profit of £27,902—an increase of £3707 over the previous year, and a record. Further concessions had been made to power consumers, who were now charged 1s. 6d. to 1s. net per 1000 cubic feet, and the price of the Company's gas for all purposes was one of the lowest in the country. Alterations were being made at the Hendon works, with a view to more economical working, and an increased yield of gas per ton of coal. The sum of £15,000 had been allocated for this purpose, £9742 of which had already been spent. The Ayres Quay works were doing well; and the vertical retorts continued to give satisfaction. The provision for renewal and alteration of mains stood at £10,638; but in the near future it would be necessary to increase the size of the mains in some congested districts, which would materially reduce this amount. Provision for workmen's compensation stood at £11,169—a substantial and adequate sum. In conclusion, he had pleasure in bearing testimony to the energy of the staff, and their keen interest in the welfare of the Company. Nor did he forget the workmen, with whom their relations continued to be friendly.

The report (which stated that the make of gas had increased 8·19 per cent. over the previous year)was adopted; and the maximum dividend of 5 per cent. on the original stock and 4¼ per cent. on the additional capital stock (less income-tax) were declared. Thanks were given to the Chairman and Directors, the Secretary (Mr. Norman S. Cox), the Engineer (Mr. C. Dru Drury), and the staff.

READING GAS COMPANY'S JUBILEE.

The report presented at the annual meeting of the Reading Gas Company last Tuesday stated that the sale of gas had increased by 24,843,000 cubic feet, while the revenue derived from residuals and other sources also showed a satisfactory increase. The jubilee of the Company had been celebrated during the year. To commemorate the occasion, the workmen's club and mess-rooms were enlarged and improved, and a bonus on wages (based principally on length of service) was distributed. Further extensions in the plant had been successfully completed and brought into operation. The accounts showed that the income for the year was £109,658, and the expenditure £89,195; leaving a balance of £20,463 to go to profit and loss account. The sum available for distribution was £38,916; and the Directors recommended dividends for the past six months at the rate of 5 per cent. per annum on the preference shares and ordinary stock—interim dividends having been already declared for the first half of the year.

The Chairman (Mr. J. Okey Taylor, J.P.), in moving the adoption of the report, said that the past year had been an eventful one, inasmuch as they had celebrated the jubilee of the Company. The present Company was incorporated in 1862; and he thought he might say that during the whole period of fifty years the Directors had conducted the business in the interests of shareholders and consumers alike. The charge for gas in 1862 was 5s. 6d. per 1000 cubic feet, as compared with 2s. 4d. at the present time. This fact alone was sufficient to show that the consumers had largely benefited; and during the whole of the period the shareholders had received the maximum dividends authorized by Parliament. If he might be excused a personal reference, he was proud to say that he had been Chairman of the Company during the fifty years of its existence, and that he highly appreciated the great compliment paid him in the request that his portrait should be painted in commemoration of his long service. It had been a very great privilege for him throughout his term of office to be associated with Mr. H. B. Blandy, their esteemed Deputy-Chairman, who joined the Board in 1862. It had been a source of very great pleasure to him and the Directors to notice the good feeling which existed among the workers of the Company; and the Board had always been anxious to encourage this feeling. They were greatly honoured by the presence of Sir Corbet Woodall at their jubilee celebrations. Sir Corbet was a man of many activities; and nobody could be more pleased than the Directors of the Reading Gas Company with the honour of knighthood which had recently been conferred upon him in recognition of his many public services. During the year the British Commercial Gas Association had completed its organization, and had done excellent work by advertisements and literature in educating the public mind to the advantages of gas, and in counteracting the many fallacies and fictions which had been sown broadcast throughout the kingdom with the evident object of prejudicing people against its use. Much good had already been accomplished, and he believed it would not be long before every gas undertaking in the country would contribute to the funds of the Association, which so thoroughly deserved their support. Notwithstanding the fact that the price of gas had been reduced upon three occasions (involving some £8000) during the past two years, the revenue for 1912 was only about £1378 less than in 1911. The Company were at present engaged in extending their mains to Sonning, and also to a portion of Tilehurst not previously supplied. Their Engineer (Mr. Douglas H. Helps) and Secretary (Mr. A. B. Stedman), together with their respective staffs, had worked loyally in the Company's interests; and it was owing to the cordial feeling which existed among the officers and men that they were able to show such good results.

The report and accounts were unanimously adopted, and hearty votes of thanks were accorded to the Chairman, Directors, and staff. In response, Mr. Helps said he appreciated very much the great assistance he had received from the officers and workmen, and desired to endorse all that the Chairman had stated as to the pleasant relationship existing between employers and employees.

GAS SUPPLY IN HENDON AND SOUTHGATE.

The reports presented at the last half-yearly meetings of two of the Companies supplying gas in the northern suburbs of London show increased appreciation of gas both for lighting and cooking purposes.

The report of the Directors of the North Middlesex Gas Company, which was submitted to the shareholders on Monday last week, was of a very satisfactory character. Compared with the second half of 1911, there was an increase of 17,037,800 cubic feet, or 14·6 per cent., in the quantity of gas sold in the six months ended the 31st of December; and there was a better return by £764 from residuals. The revenue from the sale of 133,261,100 cubic feet of gas for public and private lighting was £22,137; the rental of meters, stoves, and fittings produced £2635; and the total receipts amounted to £28,652. The following were the principal items of expenditure: Manufacture of gas, £13,134; distribution, £6488; rent, rates, and taxes, £1047; management, £1700. The total expenses being £23,304, there was a balance of £5348 to go to the profit and loss account. The amount available for distribution was £8448; and the Directors recommended the declaration of dividends at the rate of £5, £10 10s., and £7 7s. per cent. per annum on the preference, original, and additional capital respectively, and the carrying of £609 to the reserve fund. This appropriation amounted to £4265, and left a balance of £4183 to be carried forward.

At the meeting of the Southgate and District Gas Company last Thursday, the Directors reported that, compared with the results for the six months ended Dec. 31, 1911, there was an increase of 7,549,200 cubic feet, or 8 per cent., in the quantity of gas sold in the past half year; while the returns from the sale of residuals were £148 higher. The sale of 102,189,100 cubic feet of gas for public and private lighting produced £17,040; and the rental of meters, stoves, and fittings, £1719. The total revenue was £22,161. The expenditure on the manufacture of gas was £10,904; on distribution, £3854; on management, £1379. The total expenses amounted to £18,017. The balance carried to the profit and loss account was £4144; and the amount available for distribution was £8213. The Directors recommended dividends at the rate of 5, 10, and 7 per cent. per annum, on the preference, original, and additional capital. This appropriation required £3475, and left £4738 to be carried forward.

GAS SUPPLY OF TYNEMOUTH.

Moving the adoption of the report at the annual meeting of the Tynemouth Gas Company, the Chairman (Mr. J. B. Williamson, J.P.) said they had again had a very successful year in all the manufacturing and revenue earning departments. They had carbonized 47,937 tons of coal, which was 733 tons more than in any previous year, and equal to an increase of 1·56 per cent. Coals had cost £29,000, or £5362 more than in the previous year. The gas made—which was a record—was 536 million cubic feet, an increase of over 16 million cubic feet, or 3·25 per cent. The amount received for residuals was £27,000, an increase of £4800, and equal to 21·58 per cent. Residuals had yielded 93·68 per cent. of the price paid for coal, which was an excellent result. The number of ordinary and automatic meters at Dec. 31, was 21,426, showing an increase in the number of consumers of 408. The capital account was increased by £6119, chiefly caused by extensions, and the adoption of the high-pressure system in North Shields and Whitley Bay. Mr. W. Hardie (their Engineer) was to be congratulated on the way he helped to steer the Company through the coal crisis. The net profit of the year was £10,641, and was short by £542 of the amount required for dividend purposes. The coal strike was responsible for considerably more than this sum; but, in addition, some heavy repairs and renewals, which did not occur annually, had been carried out on the works during the year, and charged against revenue. The tar and liquor separating plant had given excellent results during the year, and had afforded a new outlet for dehydrated tar, which was now being largely used locally for road-making purposes, and for which they obtained an increased price. They had under consideration the advisability of duplicating the plant, so that the whole of the make might be so treated. The gas continued to be sold at the low price of 2s. per 1000 cubic feet; and this placed the Company in an exceptionally strong position.

Mr. A. C. Hovey pointed out that during the last ten years the value of the Company's stock had increased practically 1 per cent. per annum; and he said he was convinced that the improvement was due to the unimpaired soundness of the undertaking, and to the progressive policy and careful control of the management. He also expressed his pleasure at the introduction of the system of co-partnership, and his hope that when it was working the prosperity of all connected with the Company would be advanced.

The report having been adopted, dividends at the rate of 5 per cent. per annum on the consolidated and new ordinary stock, and 4 per cent. on the preference stock (both less income-tax) were declared.

REDHILL GAS COMPANY.

Satisfactory progress was reported by the Directors at the meeting of the Redhill Gas Company last Wednesday. It was stated that the mains had been considerably extended during the past year, to meet the needs of the outlying parishes; the sale of gas had increased by more than 5 million cubic feet; and the number of consumers now exceeded 4800. The Directors recommended a dividend of 10 per cent. on the share capital, and 5 per cent. on the "B" stock, both less income-tax. Interim dividends of 4½ and 2¼ per cent. respectively were paid in September, leaving 5½ and 2¾ per cent. to be paid, and a balance of £1153 to be carried forward. The Chairman (Mr. G. R. Hunt) said the accounts showed that there was an increased demand for gas for all purposes, particularly for cooking and heating. The various concessions made to consumers during the last few years, and the many

facilities afforded for the extended use of apparatus, had without doubt resulted in an increasing demand for gas. In connection with the manufacturing plant, the Directors had decided to introduce during the present year an installation of mechanical stokers in the large retort-house, which was originally designed with a view to accommodating such machinery; and it was confidently anticipated that, by this means, great economy in the cost of manufacture would be effected. In the cost of purification, too, considerable saving in materials and labour employed might be looked for in the future, owing to the recent introduction by the Engineer and Manager (Mr. W. H. Bennett) of a new process. Though the Company were authorized by their Act to charge for gas supplied in outlying parishes a rate considerably in excess of that paid in the borough, the Directors had decided to waive such excess as from the end of January. In reply to a question, Mr. Bennett said the average quantity of gas produced per ton of coal carbonized last year was 11,760 cubic feet. The report having been adopted, the salary of the Secretary (Mr. H. Long) was increased by £50 a year; and the Chairman, Directors, officers, and staff were thanked for their services. In the course of his reply, Mr. Bennett said that one factor in securing their satisfactory results was the interest taken in the work by the men on the staff under him; and another had been that they had been more economical in the manufacture of gas. A comparison of the figures with those of two years ago showed that, while they had manufactured 9 million cubic feet more gas in 1912 than they had in 1910, yet they had used 15 tons less coal and 9293 gallons less oil. The distribution department had had to deal with the largest increase in sales during any single year since 1904; and this showed the good work that was being done by the staff and men in that department.

GOOD PROGRESS BY THE EXETER GAS COMPANY.

Adoption of the Glover-West System.

The report presented by the Directors of the Exeter Gas Company at the annual meeting of shareholders on Monday last week opened with the gratifying statement that there had been further expansion of business in the past year; the sale of gas having increased by upwards of 22 million cubic feet. The accounts accompanying the report showed a balance of £19,004 available for distribution; and the Directors recommended the payment of the usual dividends of 10 and 7 per cent. per annum on the original stock and new ordinary shares respectively. The Chairman (Mr. G. Hardy Harris), in moving the adoption of the report and accounts, said they showed progress in every respect, and progress during a time which had been more than usually arduous and trying to the Board and to the Manager (Mr. W. N. Westlake). They had had to deal with the coal strike, which dislocated trade, and especially affected the Company; but they could congratulate themselves on having overcome the difficulty without a large or very appreciable loss to the Company. The effect of the strike was not yet over; and he thought that for some little time they could not expect any drop in the price of coal. They had another great difficulty to contend with consequent on the strike, and that was in regard to freight. The small vessels they employed, such as could be brought up the Exeter Canal, were getting scarcer every day. A vessel had been built for them; but unfortunately she was lost. They had now entered into fresh contracts for a new steamer, which would soon be in regular running. Another matter which, as employers, they had to consider was the rise in salaries and wages; and this had been dealt with. In order to meet these increased charges, the Directors had to see how economies could be effected, and how the work could be more satisfactorily done; and they had resolved to adopt the Glover-West system of retorts, upon which they were spending £21,245. In conclusion, the Chairman said the Board felt greatly indebted to the members of the staff; and especially to Mr. Westlake and Mr. Wood (the Works Manager). The report was adopted, and the dividends recommended were declared.

YORK CORPORATION AND THE GAS COMPANY.

The Result of the Poll on the Purchase Question.

The improved position of the undertaking of the York Gas Company as the result of obtaining their Act and the proposed acquisition of the concern by the Corporation were the prominent subjects at the annual general meeting of shareholders last Thursday, at which Mr. J. R. Hill, the Chairman, presided. The report presented by the Directors showed that the balance of profit available for distribution was £8776; and they recommended the payment of dividends at the rate of 4 per cent. per annum on the preference and ordinary stocks, less income-tax—leaving £865 to be carried forward. There was an increase of nearly 15 million cubic feet in the quantity of gas sold last year compared with 1911. In moving the adoption of the report, the Chairman said the year covered by it had been an eventful one for the Company, and marked an epoch in its existence which the Directors had reason to believe would result in a future of continued success and advantage both to the stockholders and the consumers. The Act of 1912 was not the first which the Company had obtained from Parliament; but for the first time the representatives of the city had seriously sought to acquire the undertaking. He desired to call their attention to one or two features of the proceedings in York and London during the progress of the Bill. One feature which doubtless puzzled the citizens in deciding upon purchase or no purchase was the change in the tactics of certain of the prominent persons who were in opposition to the application of the Company. At first a considerable amount of adverse criticism was lavished on the Company and on the works and plant; but, after the terms of purchase were arranged, it was discovered that the Company had a very valuable property to sell, which would yield the city a handsome profit. He took it that the decisive vote of the citizens indicated, among other things, that they were satisfied with the treatment they had received at the Company's hands, and did not desire a change of management. That which most interested the shareholders in the provisions of the new Act was the alteration in dividends from a fixed to a sliding-scale basis. In the case of the existing ordinary stock, the dividend was formerly a fixed maximum of 4 per cent.; now it varied with the price of gas to the ordinary consumers. The price of gas had been reduced from 2s. 2d. to 2s. 1d. per 1000 cubic feet, which was 1s. 2d. below the standard price; the result being that at the end of the current year they would be entitled to declare a dividend of £4 4s. per cent. on the ordinary stock. The Directors were considering the question of introducing a co-partnership scheme with the employees. The report was adopted and the dividends recommended were declared.

NOTTINGHAM GAS WORKERS AND TRADE UNIONISM.

Nottingham appears to be regarded as a favourite battling-ground with some of the principal officials of the Gas Workers and General Labourers' Union. Not content with a recent general onslaught upon the Committee responsible for the control of the Corporation gas undertaking, the *soi-disant* friends of the workers now seem to be bent upon creating an internecine feud among the employees themselves. The wirepullers are aggrieved because all the men in the service of the Corporation will not bow the knee to the Trade Union idol. It is claimed that all the men employed at the principal carbonizing station at Basford are within the fold, which means that they conform to the all-important condition of contributing to the sinews of war; but the grievance appears to be that there are some at the Eastcroft and Woodborough Road works who dare to be independent and stand aloof. It may be that they have seen enough of late years in connection with Nottingham's staple industry to raise doubts in their minds as to the supposed unalloyed blessings attendant on trade union methods. At any rate, no effort has been spared to secure the conversion of these unregenerates—Mr. Will Thorne, M.P., the General Secretary of the Union, having paid many visits to Nottingham to second the efforts of his quondam West Ham colleague, Mr. Arthur Hayday, the District Secretary of the Union. But the outsiders remain obdurate, and the whole force of the local trade unionist movement is now being applied for to bring them into line; there being ominous mutterings as to what may follow if there are any longer "traitors" in the labour camp.

Some tall talk as to possible action—aimed presumably at the Gas Committee—had been indulged in at one or two district meetings lately; but the matter assumed a more serious turn at an assembly of the Nottingham and District Trade Council a few days since, when a letter was read from the Gas Workers' Union stating plainly that a campaign was being waged against the non-unionist employees of the Gas and Lighting Committee of the Corporation, and appealing to the Council to render any assistance necessary in dealing with the matter. Mr. Hayday enforced his point as to the necessity for the agitation by the declaration that agreements entered into by the Corporation, particularly by the Gas Committee, were likely to be threatened by the existence of a small body of men, who, having benefited by the agreements, felt that it was no longer necessary for them to pay contributions to the Union. This naïve statement of the local Secretary, and twice unsuccessful aspirant for Nottingham municipal honours, shows where the shoe really pinches. It is rank heresy that men should dare to be independent and refuse to accept the Trade Union tenets, and above all that they should prefer to keep their own money when there are others ready to look after it for them. But Mr. Hayday (and the illustration is important as not bearing merely upon a local phase of the question, but as being of general import in its application to the trend of the movement) went a step further in endeavouring to sow the seed of dissension, where none, except for outside interference, need exist. He declared that when men lapsed from the Union, they toadied to the foreman, the foreman toadied to the superintendent, the superintendent to the manager, and "the manager found himself mixed up with the members of the committee." He declared that the question had been before the General Executive in London, and that those officially responsible had been given certain power which might be used in the matter. He expressed the pious hope that there would be no friction—adding, however, that if in dealing with private individuals they required workers to be members of Trade Unions for the safety of agreements, it was right they should do the same in regard to the City Council. This means that Mr. Hayday and his friend will not be satisfied until they have the names of all the gas workers on their books as representing contributors to the sinews of war. But the non-unionists in Nottingham have no cause for alarm. Those serving under the Gas Committee, or in any other of the responsible departments of the Corporation, may rely upon adequate protection against Trade Union aggression. Moreover, when it comes to a question of interfering with the smooth running of one of the largest Corporation trading concerns, other and much more serious considerations than the maintenance of the flow of contributions to the Gas Workers and General Labourers' Union will arise.

Gas Matters at Shipley.—The gratifying statement was made at the last meeting of the Shipley Urban District Council that there were few complaints at present in regard to the gas supply, and that every effort was being made to give a constant pressure and illuminating power. It was, however, added that the supply was not expected to be entirely satisfactory until the new condensers had been installed. Referring to the matter, Mr. T. Bird remarked that it was very gratifying to find that the complaints about the gas were considerably fewer. It ought to be borne in mind that the gas-works belonged to the ratepayers; and if in the past the Council had made the mistake of pursuing economy too closely, they had paid the penalty. Though the price of gas was not so low as they would like it to be, it was no more than when the works were owned by a private Company, and the conditions of the workmen were much superior. Furthermore, if the Council had allowed the opportunity of purchase to pass, they would have been upbraided for lack of public spirit. With patience, they would come into the full advantage of public ownership.

A STUDY IN ELECTRICAL ILLUMINATION.

During last summer, the Tottenham and Edmonton Gas Company and the North Metropolitan Electric Power Supply Company were competing for the lighting of Green Lanes, Southgate. The Electric Supply Company have not a large amount of street lighting in their area, as they find that competition with low-priced gas and modern means of gas supply is not a really profitable proceeding. But naturally they do not like to be unrepresented in the streets; and therefore they offered to do the lighting of Green Lanes at a low price per lamp—the lamps we believe being switched-off during the hours when most of the respectable residents in Southgate are in the arms of Morpheus. But from the opening of the competition between the two illuminants, there were councillors who were great on "efficiencies" and other technical points of which they did not know the meaning, judging from the absurd mode of expression. There was another thing that was perfectly clear from the first, and it was that a majority of the Council had, prior to the competition, fully made up their minds that, whatever happened, they would have electricity for Green Lanes. The Councils of Doncaster, Guildford, Bournemouth, and Newmarket about the same time decided in favour of modern gas lighting. The electric papers are cock-a-hoop about the lighting of Green Lanes—"the complete triumph of electricity over gas" it is called by one enthusiastic paper. "Electrical Industries" published a photograph of the illuminating effects of this "complete triumph;" and, as we thought that our readers would be interested in the study in black and white, and the North Metropolitan Company forwarded us the block used by "Electrical Industries," we have reproduced it. The metallic filament lamps are only 50-candle power ones; and they have aërial suspension from opposite tramway standards and about 6 feet from the standards, and something like 17 ft. 6 in. from the road surface. Every other pair of standards is without lamps, so that the 50-candle light sources are widely spaced. With such spacing and at such a height, by all photometrical laws there should be poor illumination in parts of the roadway; but the electrical papers, with one accord, and almost in the same terms, tell us that there is perfect equality of illumination, and a total absence of shadows in the roadway. The manner of stating this has a suggestive uniformity about it, and we fancy from the statements as to the conditions that imagination has come to the aid of actuality. "Electrical Industries," we take it, gave the illustration as being a good

representation of the resulting illumination; and our readers must choose between the truthfulness of the photograph and the words of our electrical contemporaries as to the illuminating efficiency and uniformity that the Southgate thoroughfare presents under existing conditions. Perhaps they will reject both.

TOTTENHAM GAS COMPANY AND ELECTRICITY SUPPLY.

Local Opinions on the Subject.

As already reported, the Urban District Council of Wood Green propose to sell to the Tottenham and Edmonton Gas Company their Provisional Order for the supply of electricity. The North Metropolitan Electric Power Company are applying to the Board of Trade for a Provisional Order to enable them to supply Wood Green; and consequently the Gas Company's scheme is strenuously opposed by them.

At the meeting of the Hornsey Borough Council last week, a letter was read from Mr. Hugh C. Godfray, who wrote on behalf of the Power Company, referring to the Gas Company's Bill, and suggesting that, having regard to the increase in the price of gas which might result from the supply of gas and electricity being in the hands of a Gas Company, the Council should oppose the Bill, and that evidence from representatives of the Council might be forthcoming at the ensuing Board of Trade inquiry in favour of the scheme of his clients. The Council, however, decided to send a reply that they were unable to adopt the suggestion. The Parliamentary Committee of the Council reported on the same matter; pointing out that the Board of Trade had authorized the Council to supply electricity in a small part of the Wood Green district, but that the Order might be revoked upon "other undertakers" being authorized to supply Wood Green.

The Chamber of Commerce for Wood Green, Alexandra Park, and Bowes Park—districts which will all be affected by the scheme—recently held a meeting whereat addresses were given by the heads of both Companies; and in the end the Chamber passed a resolution that the "District Council's action in agreeing to sell their Order to the Gas Company was not in the best interests of the district. [See *ante*, p. 335.] This has caused some disagreement; and the consequence is that Mr. A. C. Denham (a Director of a company who own a large number of shops at Wood Green) has resigned his position as President of the Chamber, and has written to the trade organization an important letter which reflects the feeling of a large section of the local people. It is as follows:

> I see, according to the minutes of the last Council meeting of the Chamber of Commerce, that it was decided to support and strengthen the hands of the Electric Company before the Committee. I presume this means a Parliamentary Committee on the Gas Company's Bill. I am strongly of opinion that the best possible thing for the district to do at this juncture is to transfer their Provisional Order to the Gas Company. At this point I am afraid that I must part official company with the Chamber of Commerce. As President, although I disagreed with the vote, I was prepared to take any reasonable steps which the Chamber thought desirable; but I certainly cannot go to the length of supporting the Supply Company at a parliamentary inquiry. Therefore I can no longer remain President of the Chamber, as the facts which I feel it my duty to offer in support of the Gas Company's Bill in Parliament will be in direct opposition to the attitude of the Chamber. Apart from the loss of £500, which is a small matter, I think it would be disastrous to the interests of Wood Green at this last moment to be compulsorily taken over by the Power Company and to become the Cinderella among all the other adjoining districts. The average price for electric current now paid by the Southgate (an adjoining district) consumer, under the bargain that the Southgate Council were in a position to drive, is nearly 5d.; but what the average price would be for Wood Green, surrendered without terms, after years of opposition to the Power Company, heaven only knows. This danger is all the greater because Mr. Devonshire, of the Power Company, openly stated at the meeting that the lighting of Wood Green was now of little value to them, and they were opposing the Gas Company because they resented their interference in the domain of electric lighting. A most remarkable fact was elicited at the meeting of the Chamber of Commerce, which I was astonished did not weigh more with the members. The very highest price that the Gas Company ask power to charge any consumer is 5d. per unit. The Power Company ask powers to charge 8d. per unit. As I have said, the average price paid by the Southgate consumer to the Power Company is actually 5d. per unit; so that the Power Company's average is the Gas Company's maximum. My firm generate and supply electric current to no less than 38 shops, and to the Wood Green Empire, and on better terms than any ordinary customer in Southgate gets. Therefore I know that, for local supplies, current can be generated by gas power very cheaply, quietly, and without nuisance.

The Wood Green Citizens' Association recently discussed the proposal made by the District Council. Mr. W. J. Cowan moved that the Executive be instructed to obtain all possible information on the scheme, and to invite representatives from the two Companies to attend and give the information required. He, however, was not entirely in accord with this recommendation on behalf of the Executive, as he felt they ought to get a statement from the Council as to why they were parting with the Order, because they did not know what they were getting for handing over a very valuable exclusive right, nor did they see what advantage the Power Company would give if they were going to fix the maximum charges too high to be within the reach of ordinary consumers. After considerable discussion, an amendment was carried that the members of the Council should be asked to state their case at a full meeting of the Association.

At the meeting of the Urban District Council of Southgate (an adjoining district in which the North Metropolitan Electric Power Company have just installed a system of main road lighting), a letter was received from the Solicitor to the Power Company suggesting that evidence should be given by representatives of the Southgate Council at the Board of Trade inquiry in favour of the Company's application. The Clerk was directed to reply that the Council would not oppose the Gas Company's Bill, and therefore could not give the desired evidence.

THE AYLESBURY ELECTRIC LIGHTING SCHEME.

A Majority of Ratepayers in Favour of Speculation by the Council.

The Aylesbury District Council have secured the mandate from a majority of the ratepayers to go forward with an electric lighting scheme that is to bring upon them an initial cost of about £18,000; and now when in successive years the Council draw upon the pockets of the ratepayers for financial support for the concern, they will simply remind the ratepayers that they gave them permission to enter upon this piece of speculation, instead of leaving it to those who desired electricity to form a company to run the business and incur risks on commercial lines. There has not been any desire shown by those who have taken up this matter to jeopardize their own money, in face of the many ghastly examples of failures of small electricity undertakings in various parts of the country. There was a ratepayers' meeting on the subject recently, at which there was some tall talk and big promises by those who have been promoting the matter. But we have not the slightest hesitation in saying that there will be much waste of money before the promises are redeemed, and that the rosy estimates that have been dangled before the ratepayers will never be fulfilled under present conditions. At the public meeting of ratepayers, Mr. T. E. Pye was given the limited time of ten minutes, as an expert on behalf of the opposition, to address the meeting; and among other speakers on the same side was Mr. George Lane, the Engineer and Manager of the Gas Company. The Gas Company have made a hard fight against the proposed speculation by the Council—the Company being the third largest ratepayers in the town, and naturally strongly objecting to the Council playing with the town's finances, and committing it to a scheme towards the support of which the competing company are sure to have to contribute. There is no objection on their part to company enterprise being pitted against company enterprise, in which there is no question of any unjust penalizing of the ratepayers in general and of a competing undertaking in particular, as there frequently is under local authority administration. At the public meeting, it was announced that there would be a referendum to the ratepayers. This was made last week, and resulted in 1452 votes being registered in favour of the scheme and 439 against, or a majority in favour of 1013. There was more personal influence than understanding of the merits of the matter represented in the voting; and a large number of ratepayers, who did not like the open process of voting, abstained altogether from expressing any opinion. Numbers do not always represent wisdom and prudence; and the future history of Aylesbury's finances, we think, will show that the 439 were right, and the 1013 wrong.

WORK OF THE BRITISH COMMERCIAL GAS ASSOCIATION.

A proposal that the Gas Committee should become members of the British Commercial Gas Association, at a subscription of £50 a year, gave rise to some discussion at the quarterly meeting of the Huddersfield County Borough Council. Mr. Calverley said it had been mentioned that certain advantages would accrue to them, but from what he had seen there was nothing worth getting. In supporting the recommendation, Mr. Eastwood urged that it was very shortsighted to think that money spent on such institutions, where the best knowledge could be obtained, was wasted. He had heard some of their officials say that the expert knowledge they had gained from various associations had been of enormous value to the Corporation. It was another form of going to college. One lived in the atmosphere of those who knew; and knowledge was power. To refuse to vote the sum of £50, considering that they got more than their money back again in advertisements, was very paltry indeed. Mr. Mitchell also maintained that it was their duty to advertise and educate the people to the advantages of gas. Oldham contributed on the same basis twelve months ago, and had since doubled their subscription, so evidently they thought it was worth their while to be members. Alderman Inman expressed the opinion that the Corporation had been very lax in the past in not appointing men to attend conferences of a similar character to those of the British Commercial Gas Association; and they had missed much by not having the collective opinion of men who were well qualified to advise them. An amendment, that the money should not be spent, was then defeated by a large majority, and the Committee's minutes were adopted.

The same matter was before the Edinburgh and Leith Corporations' Gas Commissioners at their meeting last week. A notice of this matter appears elsewhere—see p. 611.

Witney Rural District Council and the Water-Works.—The Witney Rural District Council having made application to the Local Government Board for sanction to borrow £866 to defray the cost of purchasing the undertaking and works of the Bampton Water Company, an inquiry into the matter was recently conducted by Mr. F. O. Stanford, Assoc.M.Inst.C.E. The Council were represented by the Clerk (Mr. N. J. G. Ravenor); and Mr. H. Howard Humphreys, Assoc.M.Inst.C.E., the Consulting Engineer to the Council, gave evidence.

South Staffordshire Mond Gas Company.—Presiding at the annual meeting of the South Staffordshire Mond Gas (Power and Heating) Company, Mr. G. Macpherson stated that the number of customers supplied had increased from 123 to 131; and they would have had many more, if they had had gas to supply. There was every prospect of a large demand in Darlaston and Willenhall; and all possible was being done to hasten the completion of the necessary additional plant to enable them to meet the requirements of these districts. During the past year, they sold 540 million cubic feet more gas than in 1911—an increase of nearly 18½ per cent. There was a net increase in the revenue of £4212, and a total profit on revenue of £13,068. After deductions, there was a balance of £9980, out of which the Directors recommended a dividend of 5s. a share, absorbing £8262. The report was adopted, and at a subsequent special meeting the shareholders approved of the promotion of a Bill increasing the powers of the Company and to establish a co-partnership scheme.

GAS PROFITS AT LANCASTER.

Proposing the confirmation of the minutes of the Gas Committee at the monthly meeting of the Lancaster Town Council, Alderman Sir N. W. Helme, M.P., said they were desirous of dealing generously with the employees, and recommended an increase of 3d. per man per shift, with holidays for those men who worked all the year round. With regard to the labourers, they recommended an increase of ½d. per hour, arranged on the lines of the sums paid in other departments of the Corporation. Reviewing the results of the working of the undertaking, he remarked that the Committee had estimated for a balance of £5330, but had actually had a balance of £7551. They had estimated to give £4000 out of the profits to the rates, and this would have left them £1530 to carry forward; but in view of the large profit and the financial position of the Corporation, the Gas Committee had expressed a desire to contribute an extra £2000 to the relief of the rates, making a total of £6000. This would leave a balance of £1551 to carry forward to the reserve fund. It was absolutely necessary that they should endeavour to maintain the price of gas at such a figure as would encourage the use of it, and relieve the consumers from the feeling that they were being taxed in order to assist ratepayers who did not use gas. The Finance Committee were responsible as representing the Corporation, and it was their duty to harmonize the interests of the general public, who were ultimately responsible for the undertaking, with those of the gas consumers. They asked, therefore, to be allowed to take off 1d. per 1000 cubic feet from the charge made to consumers by ordinary meters, and increase the amount supplied by prepayment meters by 3 cubic feet for a penny. This would absorb £1030. No reduction was made to consumers of gas for motive power; the price remaining at the low scale adopted some time ago, varying from 1s. per 1000 cubic feet, according to the amount consumed. He congratulated the Manager (Mr. C. Armitage) upon the excellent balance-sheet, and said there was a considerable expenditure looming in the future, in the substitution of new retorts for those in use at present. They would have to incur an outlay of £28,000; and they wanted to avoid borrowing money and pay the sum by degrees out of the accumulated funds and the profits they made.

BENZOL AND NAPHTHALENE FOR MOTOR DRIVING.

Observations by Mr. G. S. Sayner, of Harrogate.

The subject of the utilization of benzol as a substitute for petrol for driving motor-cars is daily arousing greater interest among those who own or are interested in the running of these vehicles. A short time ago, the members of the Harrogate and District Automobile Club requested Mr. G. S. Sayner, the Engineer of the Harrogate Gas Company, to give them a paper on "Motor Fuels and their Future Price." He complied with the request at the recent annual meeting of the club, and was accorded the thanks of the audience.

Having briefly introduced his subject, Mr. Sayner dealt with the properties of the different fuels adaptable for use in motors, taking first paraffin and petrol. Coming to benzol, he pointed out that it is one of the first products of the distillations of coal tar, and is obtained in very large quantities on the Continent, and to a limited extent (now increasing largely) from the recovery plants fitted to ovens in which metallurgical coke is produced. This hydrocarbon has the formula C_6H_6, and is only a little less volatile than petrol; 1 lb. giving 4·5 cubic feet of vapour at normal temperature and pressure. Like all the volatile hydrocarbons, there is a certain amount of variation in the determinations of its calorific value—from 18,188 B.Th.U. according to Thompson to 17,780 as determined by the bomb calorimeter. The commercial washed or rectified 90 per cent. benzol is the only kind really suitable for motors, though Mr. Sayner said he had run a car on the crude 60 per cent. unwashed. There is no difficulty in driving motor carriages of any description with 90 per cent. benzol as the principal fuel. It is used by the heavy motor vans belonging to the Metropolitan and Suburban Gas Companies, as well as by others which are now familiar objects in the greater towns; and this is further borne out by the fact that 80 per cent. of the benzol produced in this country is sent to France and is used entirely on the omnibuses of Paris. Being properly consumed, the products of combustion are not so objectionable as those from petrol as now consumed. There is a good deal in "use and wont" in these matters. Motor-cars and the boats and aircraft driven by internal combustion engines were designed for petrol; and accordingly the host of those who use motors—more by guidance of custom than in the light of expert knowledge—keep to petrol. They do not care to run unnecessary risks with fancy fuels. With regard to naphthalene, coming from various products of the distillation of coal, it contains 93·7 per cent. of carbon, and requires melting or vaporizing, and special apparatus for obtaining the explosive mixture. One advantage is its low cost—0·32d. per horse-power-hour in a recent test.

Turning to the developments which have taken place during the past five or six years and the prospects for the future, Mr. Sayner said: In looking into the future, I see great possibilities for naphthalene, as the source (coal tar) from which it is obtained is more likely to be equal to the demand. Especially we in the North of England are under a favoured position, as the tar of our coal is full of naphthalene. At present, the bulk—some 30 million gallons annually—is being exported to America as salty creosote for pickling timber. The quantity required for motor purposes could be easily provided. Recently it has been suggested before the French Society of Civil Engineers to use naphthalene as fuel in the internal combustion engine, having 93·7 per cent. of carbon, with 92·3 per cent. of benzine; the quantity of air required for complete combustion of one gramme being 13·34 grammes, against 13·04 grammes for benzine. Special apparatus is necessary for obtaining the explosive mixture of air and naphthalene, since the melting-point [79° C.] is well above atmospheric temperature. The advantages gained are: (1) Low cost; (2) security from fire, since even in the liquid state naphthalene is ignited only with difficulty, and a

leak of the liquid is not dangerous, as it solidifies immediately; (3) uniformity of composition, since naphthalene is a definite compound. The heat required for melting and vaporizing the naphthalene is obtained from the cooling water or exhaust gases, and the starting can be done with petrol, until the parts are warmed up. Hence it is only suitable in cases where stoppages of any substantial duration are infrequent. It is used for fuel on the Trans-Siberian Railway; 126,000 tons can be supplied by England, and foreign countries supply about 200,000 tons. The price is about £3 per ton.

Mr. Sayner thinks, with Professor Lewes and others, that it will be to alcohol that we shall have to turn as the light motor fuel of the future.

CO-OPERATION BETWEEN GAS COMPANIES AND MANUFACTURERS.

By Russell E. Sard, Chairman of the Manufacturers' Committee of the National Gas Association of America.

While it is true that "Necessity is the Mother of Invention," it is also true that inventions create and develop needs which never before have been felt. In no business has this been more apparent than in the gas business.

As soon as the need for a certain appliance has been felt, the minds of manufacturers have been concentrated upon the subject, until the want has been filled. In turn, these inventions, improved and perfected, have revealed new fields never before open to cultivation by gas companies. For example, the incandescent gas-burner was invented after the need was felt for some sort of gas-burner to compete with the incandescent electric lamp. Without this invention, sales of gas for lighting could never have been brought to the present enormous volume. This is equally true in regard to industrial and household appliances designed to burn gas for fuel.

One of the greatest benefits the manufacturer has derived from the Association is that the large scope and great importance of the "affiliated industries" have been forcibly brought to the attention of the gas fraternity. The manufacturers of gas appliances—all specializing in their own fields, thinking-out their problems day and night—can, when encouraged by the co-operation and guided by the intelligent criticism of the practical men in the gas companies, be of inestimable benefit to the gas industry.

The fact that this Association has representatives of the manufacturers included in the list of officers and directors, and on important committees, working shoulder to shoulder with the representatives of the gas companies, shows that the importance of the work of the manufacturers is appreciated. No unbiassed man at the present day can fail to appreciate the wonderful results that the Association has obtained in developing the sale of gas consuming appliances.

While the benefit to any single manufacturer from this source may seem remote, yet it is bound to benefit the industry as a whole, and hence each manufacturer. It may possibly be difficult to trace any direct benefits to any individual manufacturer from the Association; but it is also true that it is often hard to trace any direct benefits from advertising.

On this broad principle—that whatever benefits the manufacturing interests as a whole benefits each individual manufacturer—the Association deserves the support of every manufacturer in this country, regardless of every other argument. When the benefits from this one point of view are realized, I do not believe that the manufacturers will hesitate to join as company members.

The Manufacturers' Committee has been formed to work for the Association, and to represent the body of manufacturers in the Association in taking up any work which will make the Association more valuable to the manufacturers. The officers and board have always shown consideration for any reasonable proposition coming from the manufacturer; and I believe that they will in the future. I believe that any proposition advanced by any individual manufacturer through this Committee will be received and acted upon if the Board of Directors can consistently do so.

Let us loyally support the Association, then, by sending in our company memberships. Let us go still further and help to get others in. Manufacturers and their representatives see many gas men. If each manufacturer joined as a company member and took pains to get two more besides, the Association would have the financial support needed to broaden its work materially and to accomplish even more than they are accomplishing at the present time.

A NOVEL BEQUEST AND ITS NOVEL EFFECT.

Water Scheme Without Aid of Rates.

As a result of a judgment delivered in the High Court of Justice in Ireland (Chancery Division), last week, by Mr. Justice Barton, the Newry Urban District Council secure a bequest under the will of the late Mr. Patrick Murphy, of Marcus Square, Newry, amounting to about £60,000; and it is proposed to use a portion of the money to solve the difficulties that have arisen in connection with the town's water supply, by, as soon as possible, providing a proper system of filtration and storage. The drainage system will also be improved and extended.

Mr. Murphy died in December, 1905; and his personal and real estate was estimated at £108,044. With regard to the bequest to the town, the testator declared that his residuary personal estate should not be handed over until 21 years from the date of his death, the interest and dividends accumulating from time to time to be invested. He wished securities realized at the end of the period named to go towards the extinction of the town debts. It was contended for the next of kin that the bequest was void; but the Crown argued that it was clear, and that there was nothing to take the case out of the ordinary rule governing charitable bequests. Mr. Justice Barton held the bequest valid, and, touching the competency of the Urban District Council to benefit by it, said a point was raised as to the gas-works and abattoir under the control of the Council, as constituting municipal trading. But this kind of enterprise, his Lordship pointed out, was regulated by particular Statutes, which took it out of the ordinary class of trading. The words "town debts" he did not consider were confined to the debt due or loans, but were applicable to other debts. A scheme would have to be framed regulating the trust. The direction to accumulate the rents and profits of the real estate need not be carried out.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

The East of Scotland Juniors had an excellent outing on Saturday at Cowdenbeath, which was taken good advantage of by the members. First they met at the gas-works, where Mr. J. B. Scott, the Manager, explained each portion of the works, and showed how, in even a small works making less than 40 million cubic feet annually, labour-saving appliances can be introduced, and, worked economically, will give a good return for the money expended. These appliances were, in fact, introduced when the works were only making 20 millions.

There is a hydraulic installation with engine and accumulator by the exhauster-house, and this serves, first, the coal-waggon tipper. As the end doors of the trucks are not always at the same end, two rams have been provided to suit either pattern, and so the necessity for a turntable has been avoided. The bottom of the hopper below the tippers is the top of a tunnel with rails, which run to a hydraulic hoist capable of lifting 25 cwt., and by which the small tipping trucks are raised to an overhead gantry and pushed by hand to one of several shoots above the level of the coal-store, and there tipped so as to slide into the store. Thus the coals are stored without any shovel work; and one man does all the storing during the day shift. The coal-store is provided with arches so as to bring the floor some 5 or 6 feet above that of the retort-house. The crown of the arches being provided with doors, the charging barrows are brought under the desired arch and filled, still without the use of a shovel, although now this useful appliance is employed for filling the retorts.

In front of the retorts is another tunnel, also running to the hoist. The coke, as drawn, is conveyed by shoots, through the floor, to iron tipping trucks in the tunnel, and pushed to where a water-spray quenches it, and then to the hoist, up which it goes to the gantry, and by another shoot it is tipped on the coke heap or through a revolving screen direct to trucks on the railway siding—again without any shovelling. Should it be necessary to load trucks from the coke heap, there is a tunnel connected to the hoist and running under the coke storage ground, with doors through which the tipping trucks can be filled by gravity, taken to the hoist, and thence to the screen and shoot, and no shovel required.

All the work so far detailed has been done by one man, except the stoking, which employs two men on each of the eight-hour shifts. At a cost of about £800 of capital-expenditure (or, say, £40 a year at 5 per cent interest), this saving of the hard labour of the gas worker has been obtained; and while the workmen have reaped the greatest benefit, the Company have certainly been remunerated for their outlay. It should be mentioned that the system adopted follows closely that arranged at Dunfermline by Mr. Alex. Waddell.

After the examination of the gas-works, the party visited the Fife Mining Rescue Station—the only one of its kind in Scotland—and were shown by Mr. Stevenson the way miners are taught to make passages through fallen rocks and stones, while working in smoke helmets, and to bring back dummies, of the size and weight of men, through such passages, all in an atmosphere of smoke. Another helmet and appurtenances were of great interest, as by its means a man could enter a gasholder full of gas and live in it for some hours, if necessary. It consists of an oxygen cylinder under high pressure, but from which the oxygen can be drawn by the wearer at atmospheric pressure. When he exhales, the carbonic acid and nitrogen pass through a purifier, which absorbs the carbonic acid, and the nitrogen passes to a gas-bag, and is drawn from it, in the proper proportion, along with the oxygen from the cylinder; so that the oxygen is diluted as required, and the nitrogen is used over and over again. A piece of apparatus which was of even greater interest to gas folk, and which might find a place in every gas-works, except perhaps the smallest, as was voiced by Mr. Waddell, was the "Pulmotor," by which a man who has been "gassed" is given oxygen into his lungs, and then the products withdrawn—in other words, a system of artificial respiration is automatically given by the pressure of the oxygen in the cylinder. This "Pulmotor," which is made in Germany, costs £25, which is surely not a great sum, if even one human life is saved by its use.

The next visit was to the Mining School; and when one saw the completeness of the arrangements, and the evidence of the money expended by the mining authorities upon it, one was tempted to compare it with the assistance that is given to the classes which are held throughout the country in "Gas Manufacture and Supply," and to think how much easier it would be to the student if the gas companies and corporations would provide equipment on the same lines, so that the apparatus could not only be described, but ocular demonstration could be given in the use and make of the various parts of a gas-works. The Diesel oil-engines that provides the motive power for the lighting of the streets of the burgh, which is of 150-horse power, was shown by the Electricity Engineer, and was examined by many on account of the economies obtained by its use, as the cost of each Board of Trade unit is said to be only 0·22d.

This concluded the visit, with the exception of that to the Crown Hotel, where the Directors of the Gas Company had provided a very lavish spread, to which every justice was done. Afterwards an adjournment was made to the High Street, where a high-pressure gas

lamp, of the Keith new type with the silica mantle cover, had been installed by Mr. Waddell for the benefit of the visitors.

Edinburgh.—The Gas Commissioners have decided, by a majority of 18 to 3, to give a contribution of £100 for one year to the British Commercial Gas Association, although this was not done without discussion and dissent on the part of Bailie Pennell. Bailie Lindsay moved the approval of the minute of the Works Committee that the foreman at the Granton Gas-Works be given an increase of wages. Bailie Pennell again protested at what he called the "extraordinary disparity between the wages paid to the foreman at the Granton Gas-Works and at other gas-works." He also took exception to the fitness for the duties of certain of the foremen, stating that a foreman plumber's previous experience had been that of a carter. He then held that drink was being brought into the works, and objected to what he called "lushing" of the foremen. Bailie Lindsay, however, stated that Mr. Masterton, the Engineer, had had a watch kept upon the works for a week, and during that time no suspicious person entered or left them. After further discussion, the motion was agreed to. The Lord Provost pointed out that if these charges of Bailie Pennell were substantiated, the increase, which would not take effect until May 15, could be stopped, and the men discharged. The increase of £100 in the salary of the Clerk, Mr. Jack, was agreed to.

The stealing of money from slot-meters will not be so frequently carried out if sentences of 14 days' imprisonment are to be the result. This is the punishment given by Sheriff-Substitute Orr in the Edinburgh Sheriff Summary Court on Friday, to a man named Daniel John Somerville, who had stolen 23s. 2d. in money from a slot-meter in a house in Carnegie Street, Edinburgh.

Aberdeen.—The litigation for the levying of rates for the payment of the expenses of the unsuccessful promotion of the recent Provisional Order and Bill for a supply of water from the River Avon, in Banffshire, to Aberdeen has been at last settled by an application to the Court for the authority to a joint minute. In the Outer House, the complainers were stated to have no title or interest to insist in the action; but on reclaiming, the First Division found that the Corporation were not entitled to levy such rates. It was then suggested that the Corporation might pay these expenses out of the Common Good. The terms of the settlement between the parties were not disclosed. The Gas Committee met on Wednesday afternoon, when Mr. Sangster, the Convener, presided. It was agreed to accept the offer of Messrs. George Waller and Sons, of Stroud, for the erection of new exhausting plant at a cost of £796.

Dumbarton.—The question of the oldest Freemason in the world has been debated in correspondence in the Scottish newspapers, and at present this position seems to be held by Mr. James R. B. Christie, of Hillhead, who was formerly owner of the Dumbarton Gas-Works. Mr. Christie is hale and active, and is now in his 96th year. He was initiated in Dumbarton Kilwinning Lodge, No. 10, on March 12, 1839.

Kirkcaldy.—Further indignation meetings are being held in the burgh at the action of the Town Council in suggesting the spending of £46,000 on a scheme of extension for the gas-works, which was stated to be contrary to the wishes of the majority of the ratepayers. In the resolution which was ultimately carried, the meeting stated its opinion that by the erection of a gasholder for the storage of each Sunday's full make of gas the gas consumption in years to come would be easily supplied. Owing to a mishap at the gas-works early on Thursday morning, the gas was turned off from the works to Port Brae; all lights south of the High Street being extinguished.

Larkhall.—The annual general meeting of the shareholders of the Larkhall Gas Company, Limited, was held on Friday—Mr. Andrew Hamilton, the Chairman, presiding. The Directors' report showed a very satisfactory statement of the year's working of the Company. The net balance available for appropriation was £1638. Out of this, the Directors recommend that the sum of £893 be set apart for the payment of a dividend of 10 per cent. on the capital stock, that £100 be placed to the reserve fund, and that the balance of £645 be carried forward to the next year. The report was unanimously adopted.

Waverley Gas Managers' Association.—The Committee have had the question of the establishment of a Commercial Section, which was suggested to them by Mr. Napier, of Alloa, at their meeting in Edinburgh last June. They have had considerable discussion with the North British Association Commercial Section, but have been unable to agree to the proposals of the latter body, which practically amounted to the affiliation or merging of the older Association (the Waverley) with the other—at least, so far as the Commercial Section was concerned—and this did not meet with approval. The Committee have therefore decided to recommend to the members of the Waverley Association that they should form a separate Commercial Section of their own; and this, no doubt, will be discussed at their meeting on June 20.

Progress at Chichester.—The Chairman of the Chichester Gas Company (Mr. W. A. Walker) was able to congratulate the proprietors at the half-yearly meeting on the favourable results of the six months' working. He pointed out that the increase in the quantity of gas sold amounted to 6·9 per cent., and said the Company had benefited very considerably during the half year from the fact that, by the exercise of great care and ability, their Engineer and Manager (Mr. T. E. Pye) had increased the sale of gas per ton of coal carbonized from 11,033 to 11,307 cubic feet. He also referred to the good work done by the Secretary (Mr. V. V. Vick) and the loyalty of the staff and other employees. The balance standing to the credit of the profit and loss account, net revenue (after providing for the interest on the debenture stock, temporary loans, &c.), amounted to £2454, out of which the Directors recommended the declaration of a dividend for the half year to Dec. 31 at the rate of 8 per cent. per annum upon the "A" capital stock, and £5 12s. per cent. per annum upon the "B" and "C" capital stocks—all less income-tax.

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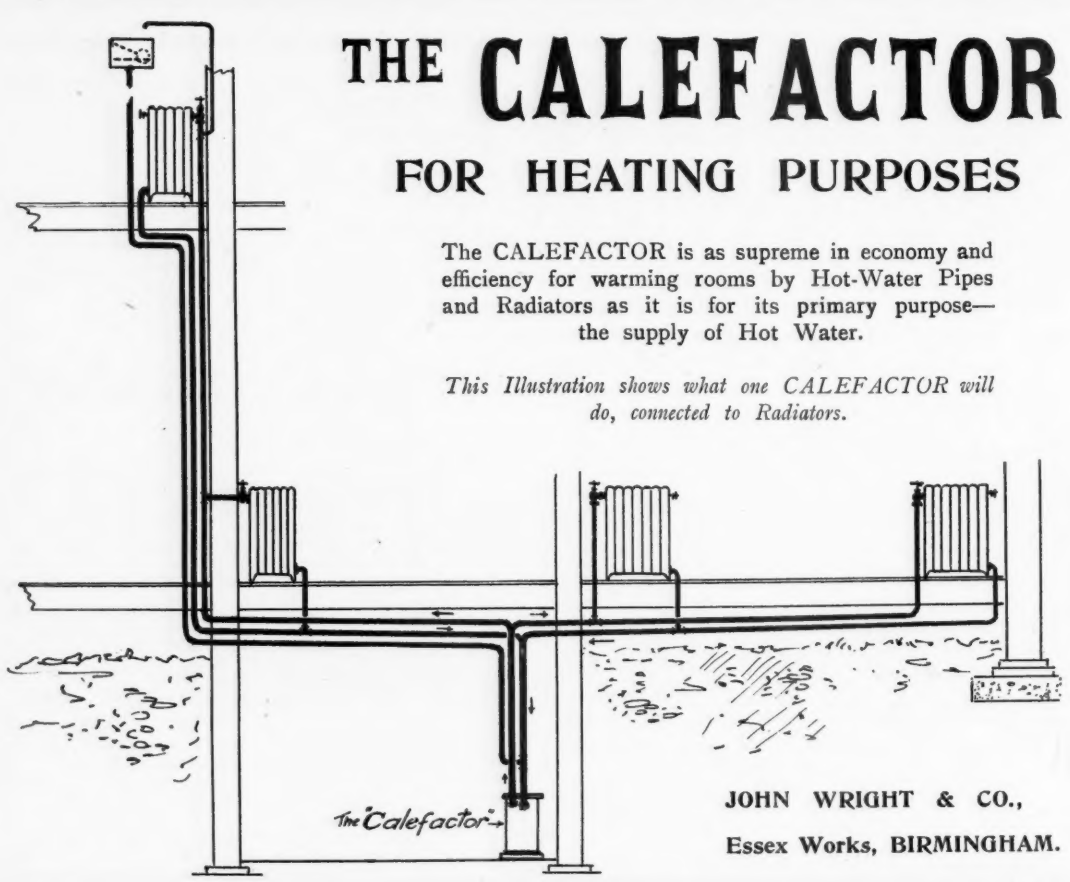
This Illustration shows what one CALEFACTOR will do, connected to Radiators.



JOHN WRIGHT & CO.,

Essex Works, BIRMINGHAM.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *March* 1.

Sulphate of Ammonia.

The demand for executing orders taken previously for February shipment, which was the main support to the market, having been satisfied, the tone has been quiet throughout the week, and a further decline in prices has to be recorded. The inquiry for home consumption has been rather better, but has still not been on a large scale. The nearest values at the close are £14 per ton f.o.b. Hull, £14 1s. 3d. per ton f.o.b. Liverpool, and £14 2s. 6d. per ton f.o.b. Leith. There has again been a lack of animation in the forward position, and no first-hand business has transpired. Makers are willing to sell up to the end of the year at prompt prices, while it is reported that dealers are offering abroad for July-December delivery at a small discount.

Nitrate of Soda.

There is no change in this market, and quotations are repeated at 12s. per cwt. and 12s. 1½d. for ordinary and refined quality respectively, on spot.

LONDON, *March* 3.

Tar Products.

The markets for tar products continue fairly steady; but business is again quiet in nearly all products. Pitch maintains its price; and the inquiry is fairly good. Some high figures have been paid for both prompt and delivery up to the end of the year. Benzols are quiet; and the increased output appears to be overtaking the demand. There is very little business doing in solvent naphtha, though the quotation keeps fairly steady. Heavy naphtha maintains its price; but new contracts are difficult to arrange. Creosote is very firm, and the inquiry is fairly good for both prompt and forward delivery. In crude carbolic, contracts are difficult to arrange. Manufacturers do not appear to be ready to come down to the price of consumers, though in one or two instances contracts are reported at to-day's figures.

The average values during the week were: Tar, 31s. to 35s. Pitch, London, 50s. to 50s. 6d.; east coast, 49s. 6d. to 50s.; west coast, Clyde, 49s. 6d. to 50s.; Manchester, 49s. to 50s.; Liverpool, 49s. 6d. to 50s. Benzol, 90 per cent., naked, London, 10½d. to 11d.; North, 10d. to 10½d.; 50-90 per cent., naked, London, 10½d.; North, 10d. Toluol, naked, London, 10½d. to 11d.; North, 10d. to 10½d. Crude naphtha, in bulk, London, 5½d. to 5⅝d.; North, 5d. to 5½d. Solvent naphtha, naked, London, 1s. 1d. to 1s. 1½d.; North, 1s. 1d. f.o.b. Heavy naphtha, naked, London, 11½d. to 1s. f.o.b.; North, 10d. to 10½d. f.o.b. Creosote, in bulk, London, 3½d. to 3⅝d.; North, 3½d. to 3¼d. Heavy oils, in bulk, 3½d. to 3⅝d. Carbolic acid, casks included, 60 per cent., prompt, east and west coasts, 1s. 10½d. to 1s. 11d. Naphthalene, £5 to £9; salts, 50s. to 55s., bags included. Anthracene, "A" quality, 1½d. to 1¾d. per unit, packages included and delivered.

Sulphate of Ammonia.

This market is very quiet; and the expected inquiries have not yet come into the market. However, manufacturers are somewhat firm in their ideas, and will not take lower prices for the forward position. Outside London makes are quoted at £13 8s. 9d.; Leith, £14 3s. 9d. to £14 5s.; Liverpool, £14 3s. 9d.; Hull, £14 2s. 6d. to £14 3s. 9d.; Middlesbrough, £14 2s. 6d. to £14 3s. 9d.

Manchester District Tar Prices.

It is officially announced that the average price realized for January deliveries of tar in the Manchester district—based on the value of the products—was 39s. 1d. per ton.

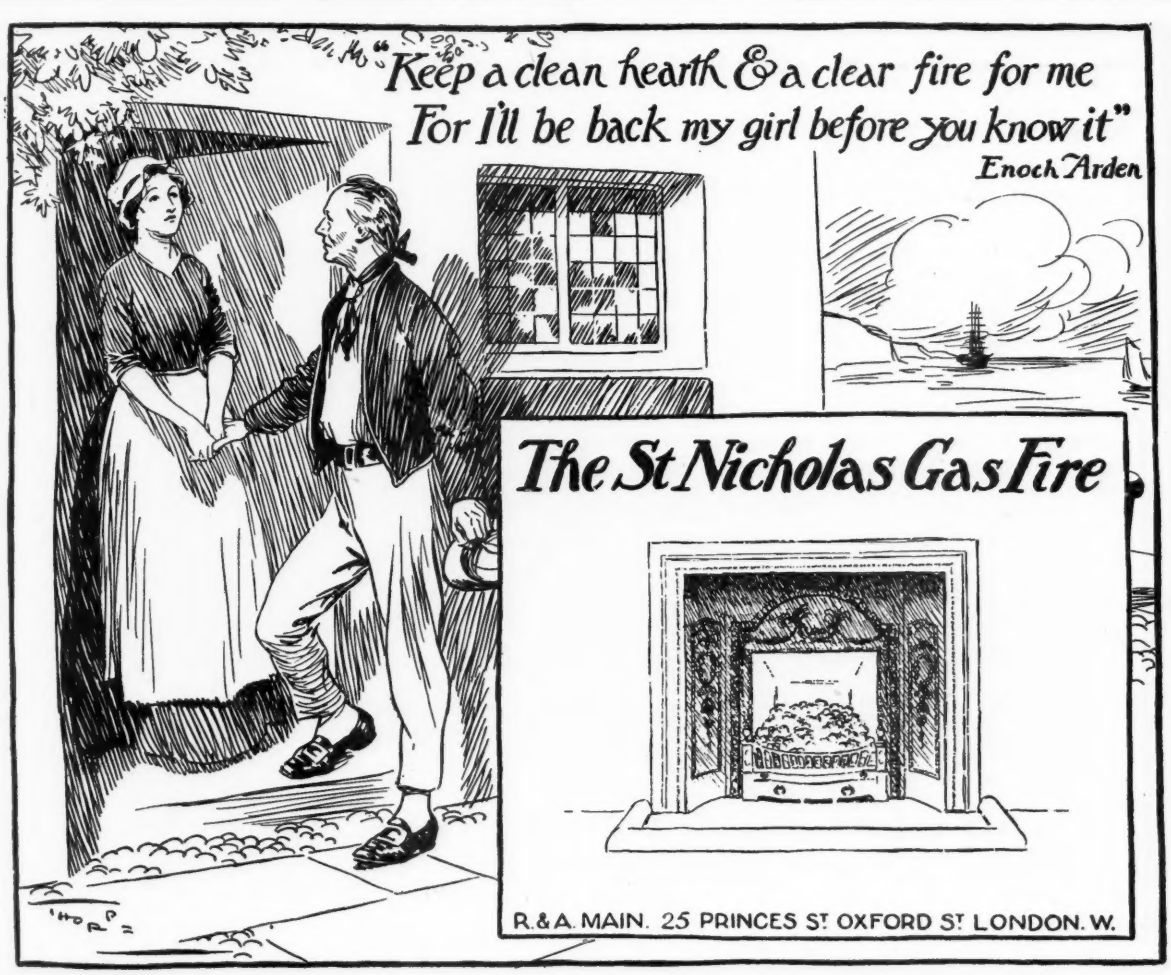
COAL TRADE REPORTS.

Northern Coal Trade.

There is a good demand for coals, with a steadier tone in the market. In the steam coal trade, best Northumbrians are from 14s. 9d. to 15s. per ton f.o.b., second-class steams are from 14s. 3d., and steam smalls are from 10s. There is a better demand for the latter kind—the use of smalls for manufacturing purposes showing a steady increase. In the gas coal trade, there is perhaps a little ease in prices, as the period of the greatest pressure in the demand is now past; but the exports are steady, and are likely to increase. Current quotations are about 14s. 3d. to 14s. 6d. per ton for best Durham gas coals. Seconds are 13s. 6d. to 13s. 9d. per ton; while for "Wear specials" about 15s. to 15s. 3d. is the f.o.b. quotation. No contracts for large quantities of gas coals have been announced in the last few days; but some sales for export of occasional cargoes are in treaty, though buyers seem to look for concessions in price which sellers are not ready to make. About 23s. 6d. to 24s. per ton is now quoted for good Durham gas coal delivered at Genoa. This shows a sharp advance on the rates for last season—due to the higher price of coal and the higher rates of freight. Coke is steady. Gas coke seems a little easier; the current quotation for good makes being now about 17s. 6d. to 18s. per ton f.o.b. in the Tyne.

Scotch Coal Trade.

The coal trade throughout Scotland is fully occupied, and coal masters are busy delivering against purchases. Tonnage for export is steady. Most of the contracts have now been placed for the current year. On Friday, on the Glasgow Coal Exchange, the following were the prices quoted: Steam coal, 13s. 6d. to 14s.; splint, 15s. to 15s. 6d.; ell, 13s. 9d. to 14s. 6d.; trebles, 14s. to 14s. 6d.; doubles, 13s. 9d. to 14s. 3d.; and singles, 13s. 6d. to 14s., f.o.b. Glasgow.


"Keep a clean hearth & a clear fire for me
For I'll be back my girl before you know it"
Enoch Arden
The St Nicholas Gas Fire
R.&A. MAIN. 25 PRINCES ST. OXFORD ST. LONDON. W.

Gas and Water at First Garden City.

Garden City, at Letchworth, Herts, is growing apace. The first year's working of First Garden City, Limited, ended on Sept. 30, 1904; and for the past year the balance on revenue account, before paying interest on borrowed money, was £10,954. On Nov. 15 last, there were 1876 permanent buildings in the "city." The services provided for the inhabitants include gas, electricity, and water supplies. In the last issued report of the Directors, it is remarked, concerning the gas-works, that "there is steady progress to report, although the coal strike interfered with the profit. It is curious also to note that the cold summer led people to keep on their kitchen fires instead of lighting their gas-cookers. A meter-house, and a new gasholder to contain 300,000 cubic feet, are being completed. A sulphate of ammonia plain is in hand, and will give a more profitable return from bye-products, as some set-off against the increased price of coal." The results during the past year strike one as being very satisfactory. The capital of the undertaking at Sept. 30 last was £38,644; and the revenue balance of £2660 represents a return on the capital of 6·8 per cent., after making ample allowance for depreciation and renewals. The works started in 1905 with an output of 4 million cubic feet; and the make during 1912 was over 50 millions. One can congratulate all concerned in this development. The total capital expenditure on the water-works was £26,183; and the balance on revenue account, £1025. The consumption of water last year was 85 million gallons. The total capital expenditure on the electricity works was £20,983; and the balance of revenue on last year's working was £624. The Directors remark that this shows a "moderate return" upon the capital employed.

Gas Workers' Strike at Sydney.—According to a Reuter telegram sent from Sydney last Friday, the result of the refusal of the Arbitration Court to vary an award has been that the North Sydney gas employees have struck for an increase in wages of 1s. a day. The workmen of the Australian Gaslight Company at Mortlake, supplying the western suburbs, have also struck; and the city workmen of the latter Company now threaten to come out unless an increase of 1s. is granted.

Reduction in Price at Altrincham.—The welcome announcement was made in the annual report of the Directors of the Altrincham Gas Company that it had been decided to further reduce the price of gas 1d. per 1000 cubic feet, commencing from the March meter-reading. Regret was expressed at having to record the death of the Chairman, the late Judge Bradbury. With reference to the accounts for 1912, the profit shown by the revenue account was £10,120, which compared with £10,773 for the previous year. The reduction in the price of gas from Jan. 1 last year, and the recent increase in the price of coal, far more than accounted for the difference. The balance shown by the profit and loss account as available for dividend was £11,516, which will provide for payment of the full statutory dividends, and leave a balance of £7862 to be carried forward.

Nottingham Corporation and District Consumers.

With irrepressible pertinacity, the agitation is being continued in the Nottingham district, on the part of one of the outside authorities, to secure a share for extra municipal consumers of the profits of the Nottingham Corporation gas undertaking. Undismayed by the failure which had attended the effort in other quarters, the Eastwood Urban Council, which has been responsible for the agitation, invited the Carlton authority, at its last meeting, to join with five others in the cost of taking counsel's opinion as to the proper construction of the Corporation Gas Acts, and as to claims which places outside the City had to a share of the profits. But the Carlton District Council, whose territory lies immediately contiguous to the City boundary, were not so foolish as to waste time in regard to a claim, the absurdity of which has been more than once demonstrated. It was directed that the letter should be allowed to lie on the table. It appears, therefore, from the repeated checkmates which the Eastwood people have experienced in their attempts to enlist support, that if the insatiable desire for obtaining counsel's opinion on this not very obscure point is to be gratified, Eastwood alone will have the doubtful privilege of footing the bill.

Main Extensions at Southend.

At the meeting of the Southend Gas Company, Mr. C. F. Woosnam, who presided, in proposing the adoption of the report for the half year to Dec. 31, said the capital account still stood at £403,865. No fresh capital had been raised in the past six months; but the Board had resolved to offer by tender next May £22,500 of "B" stock. This would enable them to wipe off the over-spent balance of £16,402. The amount spent on new mains in the period under review (£4883) was, he believed, the largest outlay under this heading they had ever had. In twelve months they had laid nearly 4 miles of mains. In the past six months they had sold 21 million cubic feet more gas. Under repairs and maintenance, there was included a sum of over £4000 for refurnishing and rebuilding the benches in the old retort-house. In fact, they had done all they could in the way of maintenance and repairs, so as to be in a better position to meet the higher price of coals this year. Out of the 16,000 odd consumers, over 11,000 had prepayment meters. The half-year's working showed a profit of £9217. This, added to the undivided balance, gave a sum (after meeting interest charges) of £10,798 available for the dividend, which amounted to £7855; leaving £2943 to be carried forward. The Vice-Chairman (Mr. James Randall), in seconding the motion, remarked that the output of gas, as compared with the corresponding period of the previous year, showed an increase of 11 per cent. The report and balance-sheet having been adopted, dividends were declared on the original consolidated and new ordinary stocks at the rate of 5⅞ per cent. per annum, and on the new ordinary "B" stock at the rate of 5½ per cent. per annum (less income-tax). The Secretary (Mr. J. T. Randall), the Engineer (Mr. Francis Clark), and staff were thanked for their services.

A Plate Rack for every Cooker.

Nearly 20 years ago we were the pioneers of the Enamelled Crown Plate for Gas Cookers—to-day no cooker is complete without it. Two years ago we were the first to introduce for use with the ordinary Gas Cooker the Plate Rack and the Enamelled Back Plate, which not only protects the wall from grease and dirt, but adds to the cleanly appearance of the cooker. It will soon be realized that they are just as necessary for the complete equipment of the Gas Cooker as the Crown Plate has now become, and no cooker will be supplied without them. The Richmond's **"Universal"** Plate Rack and Back Plate is made to fit any make of Gas Cooker and is fully patented (No. 9692/1910). Sample and lists on application.

Showing "Universal" fixed to Cooker.

The Richmond Gas Stove & Meter Co., LTD.,

Gas Apparatus Specialists,

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Grays and Tilbury Gas Bill.

The half-yearly meeting of the Grays and Tilbury Gas Company was held on the 24th ult., when dividends at the rate of 8½ per cent. per annum on the "A" shares and £5 19s. per cent. per annum on the "B" shares (less income-tax) were declared. The Chairman (Mr. F. E. Bartlett), in moving the adoption of the report and balance-sheet, congratulated the shareholders upon the excellent results of the half-year's working. The revenue account showed a profit of £3580, and the profit and loss (net revenue) account a balance of £6047. The dividends will absorb £2515, leaving a balance of £3532 to be carried forward. The quantity of gas sold showed an increase of 8·79 per cent. as compared with the corresponding half of 1911. A hearty vote of thanks to the Directors having been carried, the Chairman proposed a similar vote to the Engineer and Manager (Mr. A. W. Sumner), the Secretary (Mr. W. F. Whittaker), and their staffs, and referred to the efficient manner in which they had discharged their duties. An extraordinary meeting was afterwards held; and it was unanimously resolved to approve the Bill promoted by the Directors for the extension of the limits of supply, for the acquisition of certain other gas undertakings, and for other purposes.

Another Record Year at Newcastle.

The shareholders of the Newcastle-upon-Tyne and Gateshead Gas Company had submitted to them at their recent annual meeting a report which contained the gratifying announcement that the quantity of gas sold last year again constituted a record; being 3,107,145,000 cubic feet, or 52,525,000 cubic feet (1·72 per cent.) more than in 1911. Notwithstanding the reduction of 1d. per 1000 cubic feet in the price of gas throughout the year, the revenue from this source was £281,351, compared with £286,449 before; while the returns from residuals were the largest received in the Company's history—viz., £156,848, against £131,091. Coal and oil, owing to increased prices for the contracts dating from July last, the six weeks' strike of miners in March and April, and the railwaymen's strike in December, cost £22,180 more than in 1911. The number of consumers on the 31st of December last was 117,925, being an increase during the year of 1709 prepayment and 474 ordinary; the number of cooking-stoves on hire was 69,196, an increase of 992 prepayment and 1143 ordinary; and the number of gas-fires on hire was 6294, or 2007 more. The total revenue for the year was £483,516; and the expenditure £374,253—leaving as profit £109,263. Adding the balance brought forward (£9539) made a total of £118,802. Dividends and interest absorbed £107,389, and left £11,413 to be carried to the next account.

On the recommendation of the Engineer and Manager (Mr. J. D. Smith), the Gas Committee of the Belfast Corporation have decided to join the British Commercial Gas Association.

Claim in Respect of an Accident at the Oldbury Gas-Works.

A sequel to an accident which occurred at the Oldbury Gas-Works came before his Honour Judge Smith, at the West Bromwich County Court, last Friday. It was an application under the Workmen's Compensation Act in the matter of Joshua Harris, a horse driver, and John Jones, a haulier. On the 19th of March last year a horse fell on Harris, and crushed his left knee very badly. Mr. Dawes, who appeared for Harris and the Insurance Company, said compensation of 11s. 3d. per week had been paid to the injured man; but the allowance had been stopped, as the Company's doctor considered the man was able to do light work. It was stated that an independent doctor had examined him, but would not certify that he had completely recovered from the injury. As it was considered that he might be well in two or three months, he had agreed to accept £40 in settlement of his claim; and the Insurance Company had paid this amount into Court. His Honour made the order for Harris to receive the money at the rate of 10s. a week.

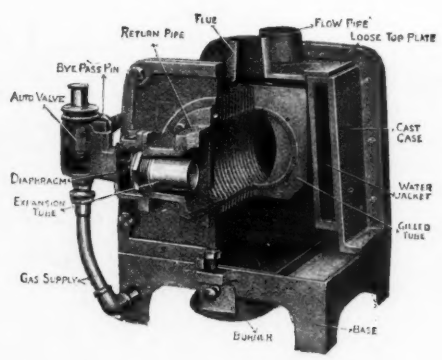
Reduction in Price at Harrogate.

The recent meeting of the Harrogate Gas Company was presided over by Mr. Francis Barber, the Chairman, who pointed out that the sales of gas showed an encouraging increase of 13½ million cubic feet, equal to 4·7 per cent.; a feature of the year's consumption being an increase in every department of use. The total quantity sold in 1912 was 296¾ million feet. The profit for the year was £18,055; and after meeting all charges for interest and dividends, and the placing of £341 to reserve, there was a very substantial amount to carry forward. This carry-over, with the reserve fund and special purposes fund, indicated the strong financial position of the Company; and in view of this position, the Directors decided that the time was opportune for reducing the gross price of gas to consumers having quarterly accounts 2d. per 1000 cubic feet as from the 31st inst.—the reduction bringing the net prices down to from 2s. 3d. to 2s. per 1000 cubic feet, according to the quantity and the purpose of use. The prepayment and weekly consumers would also have an equivalent reduction. This would represent a saving to the consumers of a sum equal to £2200 per annum. The report having been adopted and the dividends declared, hearty votes of thanks were passed to the Chairman and Directors, the Secretary and General Manager (Mr. Harry Wilkinson), and the staff and employees of every grade.

The Directors of the British Gaslight Company, Limited, propose, at the next half-yearly general meeting, to recommend, subject to audit, a dividend at the rate of 10 per cent. per annum, with a bonus of 5s. per share, for the six months ended Dec. 31 last, both less income-tax.

All Maintenance

essentials are embodied in our Gilled Circulator—an eminently scientific hot-water apparatus, RELIABLE under all conditions. It has been tested, proved and allotted pre-eminence by Engineers, Architects, and other competent judges. These features stand out boldly:



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Metropolitan Water Board Summoned for Rates.

At the Kingston County Police Court last Thursday, the Metropolitan Water Board were summoned, at the instance of the Walton District Council, for the recovery of £665 9s. 6d., the amount of the general district rate on the pumping-station in the parish. The Hon. H. Fletcher Moulton, who appeared for the Board, admitted that the rate had been properly made and levied; but as the Board was appealing to Quarter Sessions against the assessment, he asked for an undertaking on the part of the District Council that, if the Board succeeded in getting a reduction in the assessment, the amount overpaid should be returned. On receiving this undertaking, the Board would pay the rate in full. The District Council submitted that as the rate had been properly made, the Magistrates had no option but to order the Board to pay the amount due from them. An order for payment was made.

Public Lighting and Profit-Sharing at Canterbury.

Some reference to the public lighting was made by the Chairman of the Canterbury Gas and Water Company (Alderman H. Hart) at the annual meeting. He pointed out that the Corporation had decided not to purchase the gas undertaking, but had nevertheless gone in for electricity themselves. He found fault with the Lighting Committee in regard to the price they charged for the public electric lamps, as compared with the amount formerly charged by the Gas Company. The price had almost doubled; but did they get twice the amount of light? The Company were supplying gas cheaper and better than the Corporation could furnish electric light. They had received applications from some of the principal tradesmen to have installed the high-pressure system of gas lighting, which their Engineer (Mr. H. C. Page) had introduced into Canterbury. A dividend making with the interim distribution 9 per cent. for the year was declared. Later, the Chairman announced that it was proposed to start a profit-sharing scheme, on the basis of wages, so that the money could be invested in the Company, and in course of time the employees become shareholders. It was explained that, with the present dividend of 9 per cent., the employees would be entitled to 4½ per cent. on their wages; and if the Company were ever able to pay 9¾ per cent. dividend, then the workers would get 4⅞ per cent. added as bonus to their wages. The scheme, which was first suggested to the Board by Mr. Page, is not for the present to include the staff. The Chairman, in proposing a vote of thanks to the officers, spoke warmly of the services rendered by Mr. Page, Mr. J. Burch (the Secretary), Mr. J. E. Burch (Assistant-Secretary), and Mr. Buckley (Water Engineer). At an extraordinary meeting, the Directors were authorized to raise £3000 of loan capital by the creation of perpetual debenture stock.

The return of Irish Local Taxation for 1911-12 shows that the municipal indebtedness under the head of "Water Supplies" is £1,650,516; and under that of "Lighting," £1,723,509.

Wolverhampton Gas Company.

Proposing, at the half-yearly meeting of the Wolverhampton Gas Company, the adoption of the report (which showed a net profit of £12,652), Mr. B. O. Clark, the Chairman, said the Company had done exceedingly well. At the works, they had several new appliances saving money in labour; and everything was working nicely. The report was adopted, and dividends were declared at the same rates as for the previous half year—namely, 3 per cent. upon the preference stock, 5⅛ per cent. upon the consolidated stock, and 3⅛ per cent. upon the new ordinary stock, less income-tax. The Engineer (Mr. P. G. Winstanley) gave some statistics showing the amount of work done during the past year. The number of ordinary consumers had increased by 20, and slot consumers by 796. The number of ordinary cookers had gone up by 202, while slot-cookers had advanced by 903, constituting an increase in cooking-stoves of over 1100. They were, in addition, supplying two more gas-engines. In the number of public lamps there had been a heavy decrease, owing to the policy of the Corporation in lighting every street, where they had a cable, with electricity. During the year, they had lost 250 street-lamps. In the distribution department, the great thing of the year had been the extension of the mains to Codsall. Some 7 miles of steel mains had been laid down to supply the locality; and between October and Christmas they secured 47 consumers. He was glad to say that orders were still coming in. The total gas sold for the year showed an increase of 4·78 per cent.; and the bulk of it was for lighting, which was most satisfactory.

A Reduction in Price at Thorne.—The balance-sheet submitted at the annual meeting of the Thorne Gas Company showed a substantial profit on the year's working; and it was resolved to declare a dividend of 4½ per cent., and to pay off £150 on the loan account. It was decided to reduce the price of gas for lighting purposes by 2½d. per 1000 cubic feet, bringing the charge to 3s. 11½d., but not to make any alteration in the price for cooking or power purposes. It was reported that the income of the Company for the year had grown; the consumption of gas having increased, and residuals having given a much better return.

Record Profits at Tonbridge.—Drawing attention to the balance-sheet at the annual meeting of the Tonbridge Gas Company, the Chairman (Mr. W. Judd) said the profits for the past twelve months were greater than for any previous year in the history of the Company, and this notwithstanding a reduction in the price of gas in the second half of 1911. There had been an increase in consumption of 8,600,000 cubic feet, and a great demand for all kinds of gas cooking and heating appliances. The total increase in the receipts was £1527. It had been decided to widen the retort-house and put down 20-feet retorts, in place of the present 10-feet ones. It was also hoped to instal a conveyor to take the coke to an overhead hopper, from which carts and waggons could be loaded. A tribute was paid to the work of the Engineer and Secretary (Mr. J. Donaldson).

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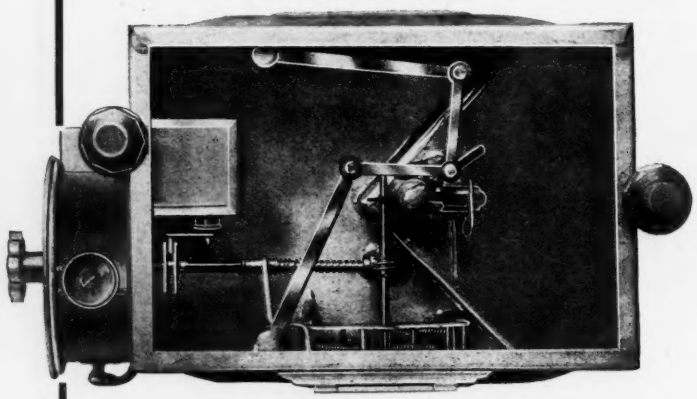
GAS METERS

With Patented Radius Price Changer.



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Improvements at the Woodbridge Gas-Works.

A formal inspection was recently made by the Directors and shareholders of the Woodbridge Gas Company, Limited, of the extensive improvements which have been carried out at the gas-works. While showing the party round, Mr. William Orme, the Engineer and Manager, explained the process of gas manufacture and drew attention to the various alterations by means of which the works have been brought up to a state of efficiency which will ensure greatly improved results. By the removal of a division wall, the retort-house has been made much more convenient; and charging machinery and a retort-house governor have been introduced. A new washer and station-meter have been put up; and purifiers have been installed which are of four or five times the capacity of those displaced. Light refreshments were served in the Engineer's office; and Mr. H. Blomfield, in welcoming the guests in the name of the Chairman (Mr. W. W. Welton), drew their attention to the various plans of the new work, which he told them had been prepared by Mr. Orme. In this connection, the following extract from the Directors' report which was submitted at the annual meeting of the Company last month is of interest: "The renewals and enlargements of the plant and mains have all been carried out much to the satisfaction of the Directors, and, in their opinion, reflect credit on their Engineer and Manager, Mr. William Orme, who prepared all the necessary plans, and superintended the whole work." A dividend of 7½ per cent. for the year was declared.

Reduction in Price at Ramsay.—It is announced that, as from the 1st prox., the Ramsay (Isle of Man) Gas Company will reduce the price of gas from 4s. 2d. to 4s. per 1000 cubic feet. The Company have declared a dividend of £1 per share for the past half year.

Automatic Lamp Controllers at Henley-on-Thames.—According to a comparative return of the cost of street lighting before and since the adoption of automatic controllers, prepared for the Town Council by the Borough Surveyor of Henley-on-Thames, the lighting of 180 lamps during the 1911 Christmas quarter cost £71 9s. 3d., while during the corresponding quarter of the past year 184 lamps cost £66 5s. 8d.; thus showing a saving of £5 3s. 7d., which is equivalent to about £20 a year. It is estimated that the net actual saving, including labour, after allowing for the hire of the controllers, is about £25 a year.

Normanton Gas Company.—Satisfactory progress was reported by the Chairman (Mr. J. Armitage) at the half-yearly meeting of the Normanton Gas Company. He said there was an addition of 191 to the number of consumers, and of 1,883,500 cubic feet in the quantity of gas sold, as compared with the corresponding half of the previous year. Dividends were declared of 6 per cent. on the original stock and 4½ per cent. on the additional stock, and £300 was transferred to the reserve fund. A vote of thanks was passed to the Directors and staff—mention being made of the recent marriage of the Secretary and Engineer (Mr. E. H. Hudson), and the wish expressed that he might enjoy prosperity in the future.

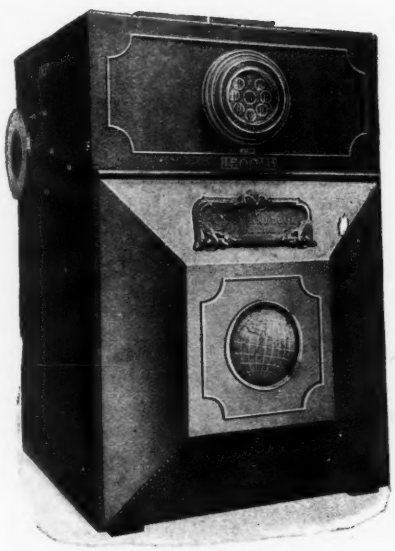
Biddulph Gas-Works Purchase Scheme.

There was held at Biddulph last Thursday, by Mr. T. C. Elkin, of the Local Government Board, an inquiry in regard to an application by the Urban District Council for a Provisional Order authorizing the purchase of the undertaking of the Biddulph, Bradley Green, and Black Bull Gas Company, Limited. Mr. S. A. H. Burne, for the Council, explained that the district had hitherto been entirely devoid of public lighting, which it was agreed was needed. After the Council had obtained an Electricity Order, Mr. J. H. Brearley was called in to report on a gas scheme; and after considering his report, the Council passed a resolution to purchase the gas-works at an agreed price of £3000. Mr. Brearley's estimate of the total capital outlay was £10,500, on the basis that at the end of three years' working the present 269 consumers would have been increased to at least 900. It was admitted by the Chairman of the Council (Mr. J. Copeland) that gas could only be supplied within a restricted area, and that several highly-rated premises would not benefit by the scheme. Mr. P. H. Barlow, the Secretary of the Gas Company, said that about 1893, when the Council first asked for terms, the price required was £5500. The figure had, however, come down, owing to the action of the Council threatening the life of the Company. Evidence was given that in 1907 Sir Corbet Woodall valued the works at £5300 net. Numerous witnesses were called for the opposition, which was based mainly on the fact that many ratepayers would derive no benefit from the scheme. A petition was submitted signed by nearly 300 inhabitants, praying that the Provisional Order be not granted.

Cradley Heath Gas Company.—The annual meeting of the shareholders of the Cradley Heath Gas Company was held on Friday, Mr. Thomas Berridge presiding. The report of the Directors stated that there had been an increased sale of gas during the year, and the profit was considerably larger. Dividends of 11¾ per cent. on the original shares, £8 4s. 6d. per cent. on the ordinary shares, and 4 per cent. on the preference shares were recommended. The report was adopted.

Harwich Gas-Works Extensions.—The report adopted at the annual meeting of the Harwich Gas Company stated that in 1901 the retort-house was rebuilt, to provide for the increasing business of the Company; but since that date the output of gas had more than doubled, and the provision then made was now quite inadequate to supply the ever-increasing demand, as was also the storage accommodation. The Directors had to ask the proprietors for the means to erect a new retort-house and coal-store, to meet the remarkable expansion of their business, and to provide a new gasholder and station-meter and governors. An interim dividend of 4 per cent. on the original capital, and £2 16s. per cent. on the additional capital was paid in August; and the Directors now recommended the payment of a final dividend of 6 per cent. on the original capital and £4 4s. per cent. on the additional capital—making dividends of 10 and 7 per cent. on the two classes of shares respectively for the year.

BRADDOCK'S IMPROVED GAS METERS



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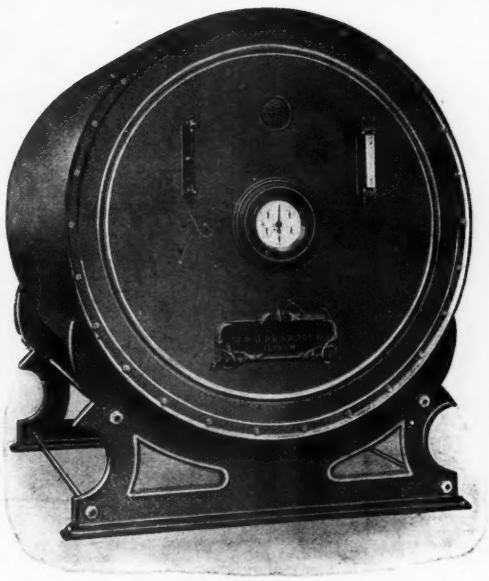

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Longwood Gas Company.—The report adopted at the annual meeting of the Longwood Gas Company stated that the quantity of gas sold during the year to Dec. 31 was 119,269,700 cubic feet, which was an increase of 2 per cent. over the previous twelve months. A dividend of 3⅜ per cent. on the consolidated ordinary stock was recommended, making, with the interim dividend, 5⅞ per cent. for the year. There had been a slight decrease in the sale of gas to mills; but this was more than accounted for by economies resulting from installations of high-pressure lighting.

Lighting of Lewisham Workhouse.—At the meeting of the Lewisham Board of Guardians on Monday last week, it was decided, on the recommendation of the General Purposes Committee, to instal the electric light throughout the workhouse and offices. In the course of the proceedings, it was announced that a letter had been received from the South Metropolitan Gas Company submitting a scheme for providing and erecting a gas-driven electricity generating plant. A Sub-Committee was appointed to visit an establishment where similar plant has been installed; and an expert is to be called in for advice.

Leighton Buzzard Gas Company.—Presiding at the annual meeting of the Leighton Buzzard Gas Company, the Chairman (Mr. R. Richmond) expressed his satisfaction at the continued progress of the business of the Company, which, he said, was in every way satisfactory. Sincere regret was expressed at the great loss the Company had sustained by the death of Mr. C. F. Ruggles (their late Manager), who had so ably conducted the affairs of the Company for the last 28 years. Dividends of 10 and 7 per cent., together with bonuses of 30 and 21 per cent., on the original and new ordinary stock respectively of the Company, were declared for the past year.

Douglas (Isle of Man) Gas Company.—The half-yearly meeting of this Company was held on Monday last week—Mr. Joseph Kay presiding. The net profit amounted to £4674. Increased sales of gas and larger returns from residuals more than compensated for the enhanced price of coal. The usual dividend of 35s. per share was declared. It was decided to extend the plant by the addition of four purifiers, which it is hoped will be ready for next season's requirements. In reply to shareholders, the Chairman stated that the Company did not propose to manufacture benzol. The sulphate of ammonia and tar are shipped to Liverpool.

Newcastle and Gateshead Water Company.—It appeared from the Directors' report that the gross receipts of the Newcastle and Gateshead Water Company for the past year amounted to £203,676, and the expenditure to £51,310. This left a balance of profit of £152,366, to which had to be added a sum of £5178 brought forward. Dividends were recommended which, with the interim distributions, would make the following rates for the year: 5 per cent. on the preference stock, 7⅞ per cent. on the original stock, and £5 6s. 9d. per cent. on the ordinary stocks under the Acts of 1876 and 1898. These dividends the Directors considered would, under all the adverse circumstances affecting the profits of the year, be considered satisfactory.

Gas and Electricity Supply at Ascot.—At the meeting of the Ascot District Gas and Electricity Company last Tuesday, the accounts presented showed a profit of £5687 on the supply of gas, and of £1517 on the sale of electric current. There was a balance of £3693 at the credit of the profit and loss account; and the Directors recommended the payment of a dividend at the rate of 6½ per cent. per annum for the six months ended Dec. 31, making 6 per cent. for the year.

St. Helen's (Isle of Wight) Water Supply.—The inconvenience experienced at St. Helen's, near Ryde, from a dearth of water has led to the proposal to erect a reservoir there to hold 300,000 gallons, at a cost of £1600; and last Wednesday an inquiry on behalf of the Local Government Board was held by Mr. J. Stuart. There was, however, a great deal of opposing evidence tendered; among the objectors to the scheme being Mr. Scott, of Broomlands, the site selected for the reservoir. The water is supplied by the Ryde Corporation.

Water Charges at Ossett.—The Ossett Town Council have decided to make some changes in their charges for water. Among them are the following: To builders, plasterers, &c., for water used for building purposes, where slaking is done on their own premises, the charge to be reduced from ¼ to ⅛ per cent. on the total cost of the building; professional photographers to be charged 6s. 6d. per annum; a charge of 1s. for the first horse power and 6d. per horse power afterwards to be made for water used for gas-engines; and a charge of 5s. per annum to be made to hairdressers.

South-West Suburban Water Company.—The gross income of this Company for the half year ended Dec. 31 amounted to £14,124; and the maintenance and management expenses came to £5081. The balance of revenue, including the amount brought forward, is £9990. The Directors, after adding £300 to the contingency fund, providing for interest on the debenture stock, and dividend at the maximum rate of 5 per cent. per annum, less tax, on the preference shares, recommend a dividend at the rate of 7 per cent. per annum, less tax, on the original shares (the same as last year); leaving £1073 to be carried forward.

Bristol Water-Works Company.—In the report presented by the Directors of this Company at the annual general meeting last Saturday, the Directors stated that the revenue from water-rates for the past year was £158,751—a decrease of £455 compared with 1911. The net sum shown by the revenue account (including £6069 brought forward) to be applicable for dividend on the ordinary capital of the Company was £74,888. Out of this, interim dividends at the rate of 7½ per cent. per annum on the ordinary shares and 5¼ per cent. per annum on the 7 per cent. maximum consolidated ordinary stock had been paid; leaving an available balance of £42,892. The Directors recommended the payment of final dividends at the respective rates of 8¼ per cent. per annum on the ordinary shares, and £5 15s. 6d. per cent. per annum on the ordinary stock; leaving £7264 to be carried forward. The capital expended during the year was £6166; and the length of mains laid was about three miles. At the close of the ordinary meeting, the Directors were authorized to issue additional 3½ per cent. debenture stock to the amount of £5094.

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SHOW-ROOMS: LONDON, 18, Adam Street, Adelphi, W.C.

South Staffordshire Water-Works Company.—At the half-yearly meeting of this Company last Thursday, the Directors reported that the gross amount of water-rates for the six months ended Dec. 31 was £77,475, against £79,548 in the corresponding period of the previous year, when the receipts were abnormally large on account of the excessive drought. They had transferred £1000 to the depreciation fund, raising it to £45,596. After providing for interest on debenture stock and on the preference stock, the amount remaining for division, including £8467 brought forward, was £29,559, out of which the Directors recommended a dividend on the ordinary stock at the rate of 6½ per cent. per annum, less income-tax, leaving £8459 to be carried forward. The Chairman (Mr. F. H. Lloyd), in moving the adoption of the report, alluded to the loss the Company had sustained by the death of Alderman Beale, and mentioned that their late Chairman's son, Mr. H. K. Beale, had been appointed to fill the vacancy created on the Board. The report was adopted. At a subsequent special meeting, approval was given to the Bill the Company are promoting for the extension of their works.

The Directors of the Monte Video Water-Works Company have declared a final dividend of 5 per cent., free of tax; making 8 per cent. for the year, after placing £10,000 to the reserve fund. For the preceding year the dividend was also 8 per cent., with £10,000 added to reserve.

It has been unanimously decided at a meeting of Flimby ratepayers to adopt the Lighting and Watching Act for the whole parish, and to accept an offer of the Maryport Urban District Council, who are prepared to supply gas at prices current within the urban district, on a satisfactory guarantee being furnished of a revenue equal to 10 per cent. per annum on the outlay.

The late Sir William Arrol has left a sum of £20,000, in preference shares of his Company (Sir William Arrol and Co., Limited), for continuing pensions which he had been in the habit of paying, and for which he had not specially provided in his settlement—all in his Trustees' discretion.

The members of the Municipal Plumbers' Research Society (employees of the Manchester Corporation Gas Department) held their first annual dinner at the Crosby Hotel, Manchester, on the 22nd ult. An enjoyable musical programme, followed by a desire for increased exertion towards greater efficiency in the maintenance section of the gas and water industry, terminated a successful evening.

The co-partners of the Merthyr Tydfil Gas Company recently held a very successful dinner and smoking concert. Mr. V. H. Thomas, one of the Directors, presided, and was supported by Dr. Scale, another Director, and Mr. J. E. Kenshole, the General Manager. After dinner, the Chairman made an interesting speech on co-partnership; pointing out how beneficial the system is to employer and workman alike. This was followed by the distribution of the co-partnership books; the bank balances shown there being a practical illustration of the benefits to the workman.

The report to be presented at the meeting of Messrs. John Wright and Eagle Range, Limited, next Monday, states that the balance of the revenue account for the year to Dec. 31 (after augmenting the contingent reserve), including £10,657 brought forward, is £70,313. After deducting the interim dividends (£18,451) paid in August last, there remains at disposal the sum of £51,862, which the Directors recommend should be appropriated thus: A dividend at the rate of 6 per cent. per annum for the past half year on the preference shares (less income-tax), £2401; a dividend of 2s. 6d. per share on the ordinary shares (free of income-tax), £26,750; place to reserve fund, £12,000; carry forward to next year, £10,711.

GAS COMPANIES' STOCK AND SHARE LIST.

It is an agreeable task to chronicle an improvement at last in the general state of things on the Stock Exchange. For this we have mainly to thank the development in Eastern Europe of promising factors which make for the re-establishment of peace. These seemed to consolidate day by day, until at the close at the week markets could almost think they heard the wings of Peace's dove with the olive branch in his bill. So mote it be! However, not all things were of roseate hue. The dark shadow of trouble between master and man hovered over the railway market; and there is a widespread feeling that the Midland dispute has not been handled wisely by the authorities. Then, the Money Market still keeps tighter than is pleasant. At the opening on Monday, there was some show of firmness; but business was so very quiet as to render it rather microscopic, and after a while it gave way. Gilt-edged things were irregular; but Consols rose ⅛. Rails closed rather lower, Americans were depressed, and Foreign inanimate. Tuesday was dead quiet; but gilt-edged were better, and Consols gained another ⅛. Some Rails were steadier; but Americans still kept bad. Business was slack on Wednesday; but the tone in most markets was lighter. In Government issues, firmness was the rule; and Rails were in more cheerful mood. Thursday was much better altogether, as the political horizon seemed clearer. Government issues were steady, Rails were more active and stronger, and even Americans recovered somewhat. Friday enjoyed a gratifying continuation of cheerfulness. Markets were buoyant, and many prices rose. Consols gained ⅛ for money and ⅜ for account. Rails were well supported, though the usual realizing checked the rise before the close. Americans progressed. Saturday was quite bright; pacification in the East being regarded as very hopeful. Most markets were in good case, though Rails were cautious, awaiting the result of strike conferences. Consols were unchanged at 74⅝ to 74⅞—a rise of ⅜ in the week. In the Money Market, there was a strong demand and an inadequate supply which hardened rates; but discount was rather easier. Business in the Gas Market again fell very quiet; and the aggregate of transactions was far below the average. Movements in price were almost imperceptible; and the numerous variations in quotation were almost wholly referable to *ex div.* correction. In Gaslight and Coke issues, the ordinary was very moderately dealt in at 101½ to 102¼. Of the secured issues, the maximum realized 81, the preference from 96 to 98, and the debenture 77. South Metropolitan changed hands at 112½ to 113¾, and the debenture made 75 and 76. Commercial 4 per cent. was done at 106½ *cum div.* Among the Suburban and Provincial group, Brentford old marked 214½, and ditto new 207 (both *cum div.*), Portsea "B" 129 *ex div.*, and South Suburban 119 *cum div.* In the Continental companies, Imperial was done at 172 to 174 (a fall of 1), ditto debenture at 85½, Union at 86, and ditto preference at 131¼ and 131¾. Among the undertakings of the remoter world, Melbourne realized 100¾, Monte Video 12⅞, Primitiva 6¾ and 6⅞, ditto preference from 5 to 5 3/32, and Buenos Ayres debenture 93 and 93½.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,551,868	Stk.	Oct. 11	5	Alliance & Dublin Ord.	75—80	..	6 5 0
374,000	,,	Jan. 16	4	Do. 4 p.c. Deb.	83—86	..	4 13 0
280,000	5	Oct. 11	7½	Bombay, Ltd.	6½—7	..	5 7 2
50,000	10	Feb. 27	15	Bourne-mouth Gas & Water Pref. 6 p.c.	28½—29½*	..	5 1 8
					15½—16*	..	4 7 6
332,000	10	,,	7		13½—14½*	..	4 4 3
75,000	10	,,	6		13½—14½*	..	4 4 3
380,000	Stk.	Feb. 27	14	Brentford Consolidated	260—265*	+2	5 5 8
330,000	,,	,,	11	Do. New	200—205*	+½	5 7 4
50,000	,,	,,	5	Do. 5 p.c. Pref.	113—115*	+½	4 6 11
206,250	,,	Dec. 12	4	Do. 4 p.c. Deb.	94—96	..	4 3 4
217,380	Stk.	Feb. 27	11	Brighton & Hove Orig.	205—210*	+½	5 4 9
244,200	,,	,,	8	Do. A Ord. Stk.	150—153*	+2	5 4 7
530,000	20	Sept. 27	12½	British	45—46	..	5 8 8
120,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb. Stk.	89—91	..	4 7 11
245,771	Stk.	,,	4	Buenos Ayres 4 p.c. Deb.	92—94	..	4 5 1
100,000	10	—	—	Cape Town & Dis., Ltd.	2—3	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	3½—4½	..	—
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	71—75	..	6 0 0
157,150	Stk.	Feb. 13	5	Chester 5 p.c. Ord.	107½—109½	..	4 11 4
1,513,280	Stk.	Feb. 27	5/9/4	Commercial 4 p.c. Stk.	103—105*	−½	5 4 1
560,000	,,	,,	5½	Do. 3½ p.c. do.	100—102*	+⅜	5 4 5
475,000	,,	Dec. 12	3	Do. 3 p.c. Deb. Stk.	71—73	..	4 2 2
800,000	Stk.	,,	4	Continental Union, Ltd.	84—87	..	4 12 0
200,000	,,	,,	7	Do. 7 p.c. Pref.	130—132	..	5 6 1
492,270	Stk.	—	5½	Derby Con. Stk.	124—125	..	4 12 0
55,000	,,	—	4	Do. Deb. Stk.	103—105	..	3 16 2
1,002,180	10	Jan. 16	10	European, Ltd.	18½—19½	..	5 2 7
16,415,840	Stk.	Feb. 13	4/17/4	Gas-light & Coke 4 p.c. Ord.	101—103	..	4 14 7
2,600,000	,,	,,	3½		3½ p.c. max.	..	80—83
4,062,235	,,	,,	4	and Coke 4 p.c. Con. Pref.	96—99	..	4 0 10
4,674,850	,,	Dec. 12	3	3 p.c. Con. Deb.	75—78	..	3 16 11
258,740	Stk.	Sept. 13	5	Hastings & St. L. 3½ p.c.	91—93	..	5 7 6
82,500	,,	,,	6½	Do. do. 5 p.c.	—	..	—
70,000	10	Oct. 11	11	Hongkong & China, Ltd.	16—16½	..	6 13 4
131,000	Stk.	Sept. 13	7⅝	Ilford A and C	154—157	..	4 17 1
65,780	,,	,,	6½	Do. B	122—124	..	4 18 9
65,500	,,	Dec. 30	4	Do. 4 p.c. Deb.	89—91	..	4 7 11
4,940,000	Stk.	Nov. 14	9	Imperial Continental	171—176	−1	5 2 3
1,235,000	Stk.	Feb. 13	3½	Do. 3½ p.c. Deb. Red.	85—87	..	4 0 6
200,242	Stk.	Aug. 29	6	Lea Bridge Ord. 5 p.c.	122—125	..	4 16 0
561,000	Stk.	Feb. 27	10	Liverpool United A	218—220*	..	4 10 11
718,100	,,	,,	7	Do. B	156½—158½*	..	4 8 4
306,083	,,	Dec. 30	4	Do. Deb. Stk.	98—100	..	4 0 0
63,480	Stk.	Jan. 16	3	Maidstone 3 p.c. Deb.	68—70	..	4 5 9
75,000	5	Nov. 28	6	Malta & Mediterranean	4½—4¾	..	6 6 4
250,000	100	Oct. 1	4½	Met. of Melbourne 4½ p.c. Deb.	99—101	..	4 9 1
541,920	20	Oct. 30	3½	Monte Video, Ltd.	12½—13	..	5 7 8
1,775,892	Stk.	Feb. 27	4½	Newc'tle&G'tesh'd Con.	100¼—101¼*	..	4 9 9
529,705	Stk.	Dec. 30	3½	Do. 3½ p.c. Deb.	85—86	−1	4 1 5
55,940	10	Feb. 27	7/7/0	North Middlesex 7 p.c.	13—14*	..	5 4 7
300,000	Stk.	Nov. 28	8	Oriental, Ltd.	125—130	..	6 3 1
60,000	5	Sept. 27	10	Ottoman, Ltd.	8¼—8¾	..	5 14 3
60,000	50	Feb. 27	13	Portsea, Island B	125—128*	+1½	5 1 7
100,000	50	,,	12	Do. C	122—125*	+1	4 16 0
249,980	5	Oct. 11	8	Primitiva Ord.	6¾—7	..	5 14 4
499,960	5	Dec. 30	5	,, 5 p.c. Pref.	5—5½	..	4 15 3
521,600	100	Dec. 2	4	,, 4 p.c. Deb.	96—98	..	4 1 8
346,198	Stk.	Dec. 30	4	River Plate 4 p.c. Deb.	92—94	..	4 5 1
275,000	5	Apl. 12	12	San Paulo, Ltd.	13—14	..	4 5 9
150,000	10	Sept. 27	6	Do. 6 p.c. Pref.	11½—12	..	5 0 0
125,000	50	Jan. 2	5	Do. 5 p.c. Deb.	49—51	..	4 18 0
135,000	Stk.	Aug. 29	10	Sheffield A	234—236	..	4 4 9
209,984	,,	,,	10	Do. B	230—232	..	4 6 2
523,500	,,	,,	10	Do. C	230—232	..	4 6 2
90,000	10	Sept. 27	7½	South African	10—11	..	6 16 4
6,429,895	Stk.	Feb. 13	5/9/4	South Met., 4 p.c. Ord.	112½—114½	..	4 15 5
1,895,445	,,	Jan. 16	3	Do. 3 p.c. Deb.	74—77	..	3 17 11
209,820	Stk.	Feb. 27	8½	South Shields Con. Stk.	160—162*	+½	5 4 11
952,795	Stk.	Feb. 27	6	S'th Suburb'n Ord. 5 p.c.	117—119*	+½	5 0 10
60,000	,,	,,	5	Do. 5 p.c. Pref.	115—117*	+½	4 5 6
117,058	,,	Dec. 30	5	Do. 5 p.c. Deb. Stk.	118—120	..	4 3 4
594,740	Stk.	Nov. 14	5	Southampton Ord.	102—105	..	4 15 3
120,000	Stk.	Feb. 13	7½	Tottenham A 5 p.c. and B 3½ p.c.	139—142	..	5 2 1
483,940	,,	,,	5¾		113—115	..	5 0 0
149,470	,,	Dec. 30	4	Edmonton 4 p.c. Deb.	92—94	..	4 5 1
182,380	10	,,	5	Tuscan, Ltd.	6¼—7½	..	6 13 4
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	96—98	..	5 2 0
236,476	Stk.	Feb. 27	5	Tynemouth, 5 p.c. max.	112½—113*	..	4 8 6
255,636	Stk.	Aug. 29	6¾	Wands-worth B 3½ p.c.	140—143	..	4 16 2
85,766	,,	Dec. 30	3	,, 3 p.c. Deb. Stk.	68—70	..	4 5 9

Prices Marked * are "Ex. Div."

We have received from Bonecourt Surface Combustion, Limited, Parliament Mansions, Victoria Street, S.W., a catalogue of their boilers for gas or oil firing and the utilization of waste heat. Illustrations and diagrams are given, and accompanying the descriptive particulars are the results of tests recently carried out of one of the Company's ten-tube boilers.

The net profit of the Richmond Gas Stove and Meter Company, Limited, for last year, including £5229 brought forward, amounted to £35,024. The sum of £5613 is applied for depreciation; and after paying the entire cost of advertising against revenue, the Directors recommend a dividend at the rate of 10 per cent. per annum, together with a bonus of 6d. per share, and carry forward £8328.

Acting upon a resolution of the Town Council, the Chesterfield Gas and Water Board have discussed the advisability of appointing a general manager for the whole of their undertakings. The matter was considered in committee, and a resolution was passed expressing the opinion that the time had arrived for such an appointment to be made. It was also decided to increase the gas labourers' wages from 4¾d. to 5d. per hour.

The death took place last Tuesday night, at the Angel Hotel, Islington, of Mr. Thomas Bickle, of Lawhitton, Launceston, Cornwall. He was found dead in bed, and the circumstances point to coal-gas poisoning. Though a strong smell of gas was detected when Mr. Bickle's bed-room was entered, the incandescent gas-jet was found to be alight, and had apparently been so all night. Beneath the burner was a small tap to which an extension tube for a table-lamp could be fitted; and it is supposed that there was a slight escape of gas from this tap.

The annual report of the Directors of Bruce Peebles and Co., Limited, for the year to Dec. 31 last states that the results were not so satisfactory as those of 1911. The profit from manufacturing, trading, &c., after appropriating £4138 for maintenance, amounted to £3864; but after deducting expenses of administration, the interest paid on the mortgage debentures, and accrued on the unsecured debentures, there was an adverse balance of £4593. The trading for the year was affected by labour strikes and consequent disorganization of business. The prospects for this year are better, owing to improvements in prices and in the demand for the Company's manufactures.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

WORKS SUPERINTENDENT. Cheltenham Gas Company. Applications by March 6.
GAS ENGINEER AND MANAGER. Ilkeston Corporation. Applications by March 15.
CANVASSER AND ADVISER. Hartlepool Gas and Water Company.
JUNIOR ASSISTANT. North Middlesex Gas Company.
PREPAYMENT METER COLLECTOR. Smethwick Gas Department.
JUNIOR FITTER. No. 5702.
STOKER. No. 5705.

Appointments, &c., Wanted.

CANVASSER. No. 5703.

Plant, &c. (Second-Hand), For Sale.

RETORTS AND FITTINGS, CONDENSERS, &c. Sutton Gas Company.

Plant, &c. (Second-Hand), Wanted.

EXHAUSTER AND ENGINE. No. 5704.

Patent Licences, &c.

GASHOLDER. W. P. Thompson and Co., 6, Lord Street, Liverpool.
MANTLE MANUFACTURE. Haseltine, Lake, and Co., 7 and 8, Southampton Buildings, W.C.

Meeting.

BRITISH GASLIGHT COMPANY. Chief Office, 11, George Yard, E.C., March 19. Twelve o'clock.

Stocks and Shares.

BARNET GAS AND WATER COMPANY. London Mart. March 11.
BISHOP'S STORTFORD, &C., GAS AND ELECTRICITY COMPANY. London Mart. March 11.
BRENTFORD GAS COMPANY. London Mart. March 11.
CEARA GAS COMPANY. London Mart. March 11.
MALTA AND MEDITERRANEAN GAS COMPANY. London Mart. March 11.
SEVENOAKS GAS COMPANY. London Mart. March 11.
TOTTENHAM AND EDMONTON GAS COMPANY. By Tender. March 18.
WALTHAM ABBEY AND CHESHUNT GAS COMPANY. London Mart. March 11.
WOKING GAS COMPANY. London Mart. March 11.

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STOCKPORT GAS DEPARTMENT. Tenders by March 19.

Gas Installation.

BIRMINGHAM UNION. Tenders by March 19.

Gasholder.

MARGAM URBAN DISTRICT COUNCIL. Tenders by March 10.

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HEBDEN BRIDGE AND MYTHOLMROYD GAS BOARD Tenders by March 10.
MIDDLETON CORPORATION. Tenders by March 5.
STOCKPORT GAS DEPARTMENT. Tenders by March 19.

Meters.

STOCKPORT GAS DEPARTMENT. Tenders by March 19

Pipes, &c.

MIDDLETON CORPORATION. Tenders by March 5.
STOCKPORT GAS DEPARTMENT. Tenders by March 19.

Pipes, &c., and Pipe Laying.

HEBDEN BRIDGE AND MYTHOLMROYD GAS BOARD Tenders by March 10.

Tar.

EXETER GASLIGHT COMPANY. Tenders by March 7.
HEBDEN BRIDGE AND MYTHOLMROYD GAS BOARD. Tenders by March 10.

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